ELECTRICAL REVIEW

October 5, 1945

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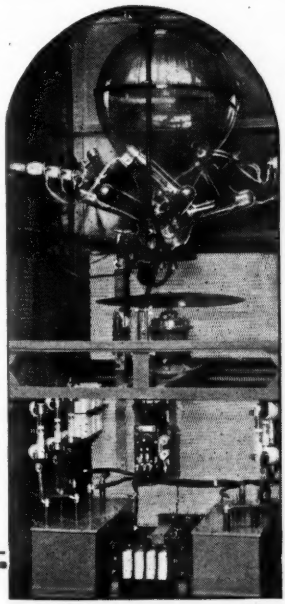

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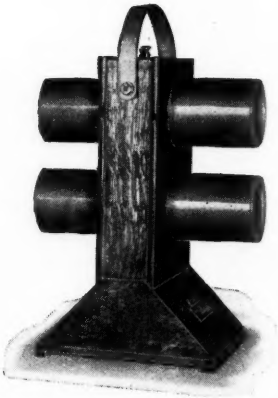

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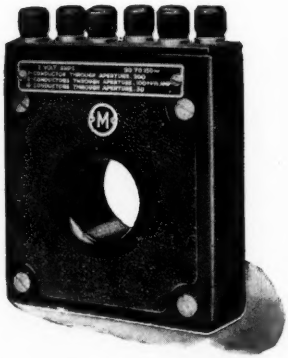

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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Plug and Socket Controversy

Wider Issues Raised by the B.S.I.

ONE size of domestic socket-outlet would be better than three. So much is common ground for agreement. Thereafter two sharply divided views are apparent. The first favours the substitution of a new all-purpose design for (and not interchangeable with) the 2-, 5- and 10-A sizes at present in use, rated for 3 kW, at 230 V, and incorporating a fuse in the plug. The second group stands for a modification of the 5-A type now made in conformity with B.S. 546 (with which it would be interchangeable dimensionally), but having a fuse in the socket.

Acceptable Standardisation

The first course was the one unanimously recommended as a Code of Practice by the Electrical Installations Committee convened by the I.E.E. at the invitation of the Ministry of Works. The other, which was put forward by the British Standards Institution in our issue of September 14th, has been subjected to criticisms in our Correspondence section, that have raised questions of the broad principles under which standardisation is acceptable.

As regards the technical aspects of the matter, the most important appear to be the possible result of inserting an "up-rated" plug connected to a 3-kW load into an old 5-A socket (of which hundreds of thousands are installed) with associated cables of like capacity, and the ignoring of the prohibition of the use of a fuse in a socket contained in the I.E.E. Regulations.

After reporting to the Ministry (Post-War Studies, No. 11) the Committee adopted the normal procedure of asking the B.S.I. to prepare an appropriate specification. The B.S.I. decided that the up-rated 5-A plug would be more suitable and intimated its intention to prepare a Standard accordingly. Thus the body responsible for designing the framework for the execution of a declared policy is unwilling to do so.

The matter does not end there, as other sections of the electrical industry, which had been consulted by the Committee have voiced strong objections to the up-rated plug and also to the implicit claim of the B.S.I. to exercise jurisdiction in this manner, which they regard as a breach of its sound tradition of securing standardisation by consent. What attitude was adopted by representatives of these sections at the later meetings of the Electrical Industry Committee of the B.S.I. we do not know, but presumably they would feel that their chief concern was with matters of detail within the scope of the specification asked for.

"Separatist" Threats

The present position is, therefore, that authorities most directly concerned with installation work do not accept the modified B.S. 546 and have hinted that they will prepare their own specification.

That would be a deplorable outcome of the deadlock. One immediate consequence might be that, whereas the Ministry of Works would adopt for its Code of Practice the recommendations of the Electrical Installations Committee, other

Government Departments, acting on their knowledge that the B.S.I. has in the past represented the considered opinion of all parties concerned, would require appliances to conform to B.S. 546 or any modifications of it. Differences of this kind could not be regarded as creditable to the electrical industry. In regard to the industry as a whole, non-compliance with British Standards is too often to be found to-day, even when these are in accord with accepted opinion, and this is an obstacle to low manufacturing costs. The drawing up of specifications independently of the British Standards Institution would weaken the position of that body as the recognised medium for standardisation and would have repercussions far beyond the present issue.

Purchase Tax

THE Federation of British Industries has joined in the demand for the reduction or abolition of purchase tax. In common with electrical organisations, it sees no justification for the maintenance of the tax on household equipment when every effort must be made to keep the prices of new houses down. A beginning has already been made in the reduction of the tax. The Treasury announced about a month ago that it proposed to reduce the rate from 33⅓ to 16⅔ per cent. on copper domestic hollow-ware. This has now been done. Last week a similar notice was issued relating to "household goods of celluloid, bakelite or other plastic material derived from cellulose, casein, papier mâché or synthetic resin, being goods of a kind used in the preparation or serving of food and drink." Having got this far the authorities might next consider domestic electrical appliances (and even gas equipment).

Physics and Engineering

OF late years the social loss due to the time lag between discoveries in electrical science and their application to everyday uses has been materially lessened. This is very largely the outcome of an increasingly intimate association between physicists and electrical engineers, the former providing data based on the observations of phenomena from which technicians select. This influx of science into engineering, of which it becomes a part, is referred to by Dr. J. L. Miller in his chairman's address to the I.E.E. North-Western Centre as a "mutation" (a change that produces a new species). For this concept to be fully realised, however, there must be strengthened co-operation between fundamental research in universities and in industrial laboratories.

High-Voltage Cables

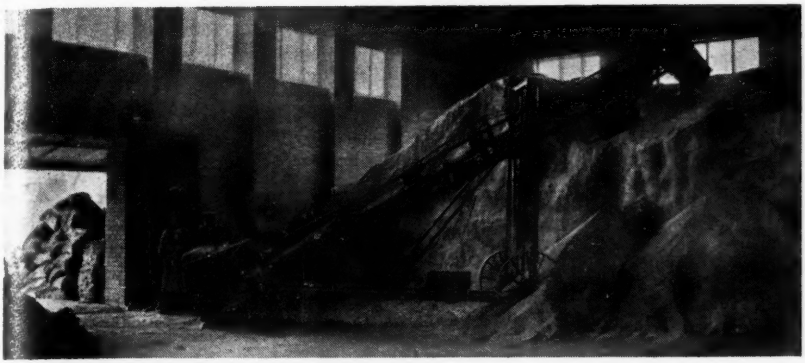
AN illustration of Dr. Miller's thesis is to be found in the history of cable development. At one time mechanical and other extraneous factors governed design and it was not until the need arose for transmission voltages in excess of about 25 kV that electrical characteristics took a leading place. Ionisation of voids in the dielectric under electrical stress introduced problems in physics that have been progressively solved until cables for working voltages in excess of those in use on the grid have become practicable. In regard to insulation generally, a future possibility seems to be that instead of adapting ready-made general utility materials, electrical engineers will call upon physicists to meet specific requirements based on electrical and manufacturing considerations.

Consumer Sampling

INVENTORIES of appliances installed on domestic consumers' premises that were drawn up in connection with frequency and voltage standardisation revealed the wide gap that generally existed between an undertaking's records and the actual position. Yet such particulars are necessary to provide reasonably accurate bulk figures which are essential for load analyses required for estimating trends of demands. To repeat such inventories from time to time is clearly impracticable but close enough results can be obtained by taking relatively small samples of consumers on the lines recommended in the new E.R.A. Technical Report referred to on another page. The information given appears to be enough to enable undertakings to carry out really useful sampling surveys.

Signs of Activity

REPORTS in this issue relating to the allocation of Government factories and licences granted to manufacturers to erect new premises show that great electrical expansion is anticipated. A large proportion of the production will be in domestic lines and export is also being kept in mind.

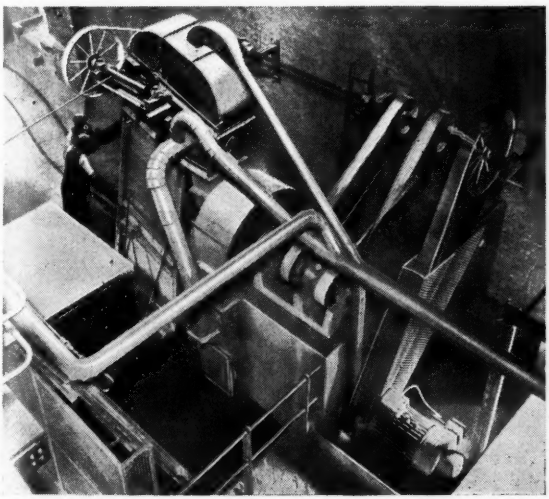


Fertiliser Production

Electrical Methods at a Granulation Plant

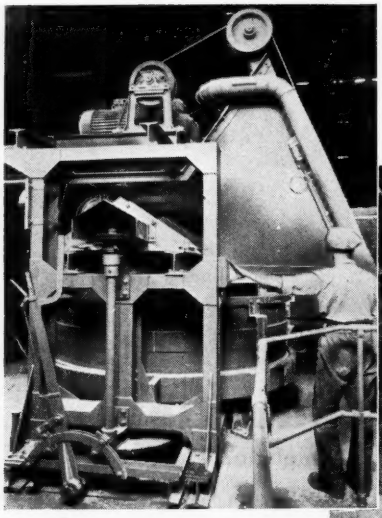
THE granulation of agricultural fertilisers is a comparatively new development. The resulting product has a number of advantages over the powder forms, the most important being its better keeping qualities. Last year the Farmers' Manure Co., Ltd., which has been producing fertilisers for well over three-quarters of a century, had its manufacturing plant at Royston, Herts, entirely redesigned for the purpose of producing fertilisers in granulated form.

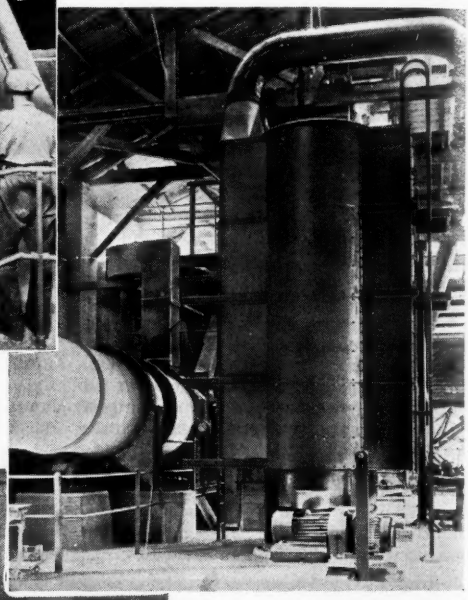
The new plant, which was designed and erected by the Sturtevant Engineering Co., Ltd., has an output capacity of five tons an hour. The raw materials are supplied from outside sources and when received are weighed and blended, the proportions of the mixture depending on the class of fertiliser required. This mixture is deposited into a disintegrator where it is crushed. It is then carried by means of an electrically operated skip bucket hoist to the mixer. This mixer comprises a revolving circular container in which the mixture, in ½-ton batches, is formed into moistened granules by the addition of an appropriate quantity of water.



After weighing, the mixture is fed to a blender-crusher of squirrel-cage design

After mixing, the moistened granules gravitate to a smoothing-out hopper and are then transferred by means of a belt conveyor to a rotary dryer-hardener. The last-named, which is equipped with an electrically operated mechanical stoker, is a long horizontal tube, heat insulated throughout its length and revolving at around

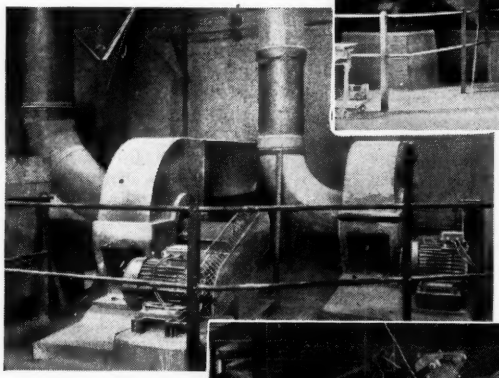


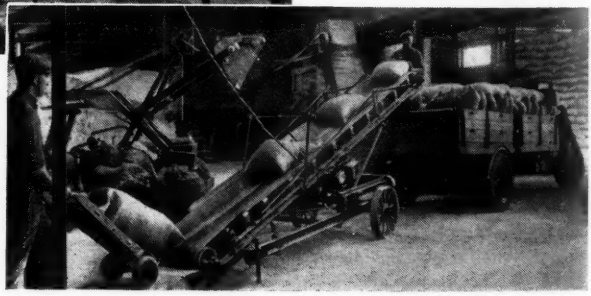


The mixer (above) makes the material into moistened granules which are then transferred to the dryer-hardener and cooler (right)

$3\frac{1}{2}$ RPM. It is here that the granules are formed, the process being assisted by a hot-air column which hardens and dries the product.

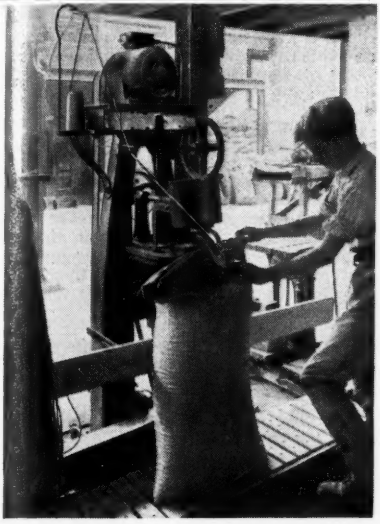
After leaving the dryer-hardener, the granules pass to a fan-operated cooler and thence *via* elevator and worm conveyor to a rotary screening unit in which the various sizes of granules are graded ready for sacking. Oversize material from the screening plant is pressed back into the cooler and re-





Gases from the hardener and cooler are drawn off by the cyclone fans (above) to a set of washing towers
A mobile inclined conveyor (right) is used for loading the sacks on to lorries

screened. Gases from the hardener and cooler are drawn off by cyclone suction fans to a set of washing towers. An electric stitching machine closes up the sacks which



The sacks are closed by means of an electric stitching machine

are then placed on a mobile inclined conveyor for loading on to lorries.

The plant is operated by seventeen electric motors totalling approximately 136 HP, the largest motor being 45 HP (for the disintegrator) and the smallest 1 HP. In a plant of this nature the motors are fixed at different levels so that some form of central control is essential. That is provided through a control panel located at the mixer platform level about 20 ft. above the floor level. From this panel the plant operator can control all the motors essential for the correct functioning of the plant and process. Push-button trips for shutting down the motors in an emergency are suitably located about the plant. In view of possible corrosion the more conventional type of conduit installation was not adopted, all cable work being Pyrotenax, fixed away from the walls on teak blocks, and treated externally with bitumastic paint.

The electricity supply at 415 V, three-phase, 50 cycles, is metered at an intake chamber in the east wing of the factory, at which point are also located the circuit-breakers controlling the factory installation. The motors and control gear were supplied by Lancashire Dynamo & Crypto, Ltd., the main control panel by Parmiter, Hope & Sugden, Ltd., switchgear by George Ellison, Ltd., and motor starters by Allen West & Co., Ltd. The electrical installation was carried out by the Northmet Power Company under the supervision of the district superintendent at Royston, Mr. F. J. Drake.

Milk Delivery Vehicles

Possible Improvements

BATTERY-DRIVEN electric vehicles for house-to-house milk delivery formed the subject of a lecture before the Southern Section of the Co-operative Dairy Managers' Association by Mr. H. W. Heyman, chief engineer, Battery Vehicle Department, Brush Electrical Engineering Co., Ltd. The lecturer explained that in spite of its greater first cost the electric vehicle should show a saving of at least 23s. per week for an average daily load of 90 gallons because of its longer life, which determined depreciation, as well as cheaper maintenance and operation, by comparison with horse-drawn and petrol vans.

He had estimated that the total post-war requirement in Great Britain for average sized milk delivery vehicles would be of the order of 12,500 or 25,000 if bread, groceries, coal, etc., were included. Those figures made it evident that mass production was out of the question. The basic chassis could be manufactured in batches of a few hundreds per year, and the lecturer stressed the importance of users accepting bodies of standard design whenever possible.

The lecturer's company hoped to improve upon the battery-assisted "hand-pram" type by introducing a small three-wheel truck, which would be very economical and also carry the operator. It would carry 75 gallons and cover a daily start-stop route of 10 miles. Its projected speed was 6·5 MPH, compared with 2·5 for the "hand-pram" and 17 MPH for full size vehicles. It was to be called the "Pony" truck, being designed to do substantially the same work as a horse, and was a development based on the Brush factory truck that had been supplied in quantities to Russia.

The employment of lightweight alloys for body building might increase the payload by about 15 per cent., which, in some cases of borderline performance and taxation specifications, might be worth the extra expense. A further increase of some 10 per cent. in payload could result from the use of aluminium in place of steel crates for milk bottles. A spectacular instance of weight saving was the use of aluminium battery cases instead of composite wood and metal boxes, which enabled a 1-ton vehicle to carry an additional 30 bottles of milk.

Views on the News

Reflections on Current Topics

UNDER the rather mistaken heading "Socialised Gas at Urmston," the *Manchester Guardian* reports an experiment by the Urmston Council on a new housing estate. The Council is to buy gas in bulk from the Stretford Gas Board and supply it to the houses, recovering the cost by an addition to the rent; there will be no separate meters. The Council does not believe that the tenants will waste gas and there is a suggestion that the method may be applied to existing estates on a voluntary basis. This is a scheme which has often been advocated for electricity supply and electrical engineers will watch the development with interest.

* * *

I always find interest in discussions of the comparative merits or failings of large and small industrial concerns and a good example was the broadcast in the Midland Home Service programme last week. The advocates of the "combine" were Mr. J. J. Gracie (G.E.C.) and Mr. G. H. Jones, secretary of the Midland Miners' Federation; on the other side were Mr. T. A. Waterhouse, a "small" employer, and Mr. G. Bostock, a factory manager. Mr. Gracie expressed satisfaction that the debate was on "The Big Combine and (not *versus*) the Small Man" because he thought that both were necessary and they depended on one another. Nevertheless he contended that the largest concerns did not always pay the biggest dividends; that they only were able to produce widely-used commodities at the lowest prices, by quantity production; that organised research was possible only on a large scale; and that they were able to look after their employees' welfare much better than small organisations.

* * *

On the other hand, Mr. Waterhouse thought that the more personal relationships which existed in the small factory led to better "welfare." There is certainly something in this but I have been in the works of large companies and have found that intimacy existing there too. Mr. Bostock considered that the customer did not always derive benefit from the cheaper production of large combines and that these often sheltered inefficiency in some of their units. The small producer was compelled by competition to operate economically and he was not hampered by "red tape." He also maintained, though here Mr. Jones demurred, that the "small" man could adapt his plant more rapidly to changing circumstances.

Professor P. Sargant Florence, the chairman summed up the debate very well, and suggested that the consumer would largely decide the issue; if he wanted mass-produced commodities, the large combine could probably best cater for him but if he wanted "individual" articles he would have to go to the small producer.

* * *

Denials have been issued by the Reorganisation Sub-Committee of the Bristol Electricity Committee of statements recently made in connection with the filling of the posts of chief engineer and general manager of the electricity undertaking. The Sub-Committee says that it is untrue that no applications were received for the appointment of chief engineer; in fact there were over forty applicants for the two jobs. It also maintains that there has been no departure from the policy with regard to salary scales adopted by the City Council many years ago.

* * *

Not only human beings appreciate electricity; even dumb animals (a ridiculous term) are grateful for the benefits which it bestows. The "E.D.A. Bulletin" reports excellent results from the casting of electrical pearls before swine. In other words the mortality rate among the litters farrowed at the piggeries of Mr. James Blundell of Banks, Lancashire, has been reduced to "practically nil" through the use of adjustable Ferranti radiators. Young pigs are further helped to attain robust porkhood by ultra-violet irradiation.

* * *

Cows, too, are among the electrically-minded. Mention is made in a newspaper of an electrically-equipped dairy farm in Perthshire where milk is more hygienically and more readily obtained from the herd than in a non-electrical establishment. One method of encouraging the animals is to provide music through a loud speaker during milking time. I have heard this one before and have wondered what the animals like best—a pastorale probably.

* * *

I am somewhat puzzled by a picture I have seen in the American *Electrical World*. It illustrates 365 consecutive daily load charts cut out and stacked up to form "hills and valleys" and the caption gives the impression that it is an original idea of "researchers" of the New York Power & Light Corporation. As this is a dodge which we have used here for goodness knows how many years it seems incredible that the Americans have only just discovered it.—**REFLECTOR.**

Apprentice Training

Programme for an Experienced Governing Committee

By E. Graham Ross, A.M.I.E.E.

In most firms with from 100 to 1,000 hands the approach to the apprentice training problem appears to the skilled observer to be how to superimpose upon the existing organisation a training scheme which will satisfy all conflicting interests. The obverse, and so much simpler, view appears to be entirely neglected, *viz.*, how to extract from the existing organisation, the essential elements of such a scheme.

The organisation will already include, among its senior executives, men who have ample practical training. A governing committee carefully chosen from this section of the staff should prepare and then operate an apprentice training scheme. At meetings lasting not more than three hours weekly, a committee of seven senior executive officials can collect and sift evidence, build up a very thorough scheme for approval, and have it put into operation within eight months. The best chairman for such a committee is an executive whose department normally holds an operational balance between other (and possibly major) departments: and with such a chairman acting also as secretary, steady committee progress is assured. In preparing the scheme the committee should consider as much "foreign" material as possible: other firms' schemes, education authorities' proposals, institution recommendations, factory suggestions—all these and more provide the bounds to the committee's picture, when taken in conjunction with works possibilities.

The members must travel round their own workshops and prepare a complete list of individual production jobs which call for skill of only apprentice standard. This will reveal (*a*) that the number of individual jobs available for training is unexpectedly large, and (*b*) that the number of kinds of apprenticeship needed becomes sharply defined. Then comes a conflict between how the premises ought to train and what they can actually achieve. This means that the committee may require to take into account apprenticeships of combined character, as well as those of clearly-cut type. For example, the final list of types might be: technical apprentice; fitter and machinist apprentice; electrical fitter apprentice; pattern maker and moulder apprentice; and plater apprentice.

In each case, the total numbers possibly to be trained are governed by individual shop capacities modified by the flow of apprentices as the years pass. Actually there may be a shortage of suitable lads. Local education authorities must be closely consulted as to their "output" of scholars from day schools, both as to quantity and type.

The committee then has to decide the minimum qualifications for acceptance as apprentices and whether the scheme is to be solely for the firm's own benefit, or also for the benefit of the industry at large. Generally, the parochial outlook will be found to render any scheme impossible, simply on account of insufficient continuous apprentice input.

Times to be spent in each shop by each type of apprentice then have to be studied (as distinct from times to be spent per detail training job). This leads to serious consideration of possible bottlenecks, *e.g.*, one shop may take twelve lathe-hands, but may possess only one horizontal borer. The detail planning of apprentice movements will be found to be easily handled only by means of a chart and coloured counters. Such a chart contains as Y-axis the complete list of training jobs above mentioned, and as X-axis sixty monthly divisions. In this way the position of each shop as to numbers, and of each apprentice as to place, at each month of the year, can be seen at a glance.

All this means clerical and other work and consequently the appointment of an apprentice supervisor, responsible directly to the committee, becomes essential. At all points, the question is raised against the committee—Do we solely train apprentices, or do we work them for shops' output? The committee must be very clear and firm as to which of these alternatives must really apply, bearing well in mind that the latter probably forms the main reason for the committee's own appointment. The trade union angle must not be neglected. Apprentices' rates of pay are fixed by agreement between firm and unions, but the training programme is a matter for the firm only—a vital point.

Without discipline any scheme will be

wrecked. The incoming apprentice should be presented with a concise explanatory document stating to what he is expected to conform, and to what extent he, in turn, may expect the firm to conform to himself. This document is then moulded into an indenture (but not a premium indenture) to be signed by the lad himself, his parent or guardian, and by the firm. This involves contact with the secretarial department, and possibly with the firm's legal adviser as each type of apprenticeship calls for its own type of indenture.

School attendance should be made compulsory by the indenture. For technical apprentices, this is easily settled, but the committee will find it difficult to compel trade apprentices to attend classes (especially evening classes) after 18 years of age. But, since this age happens to be the age fixed for day attendance of all juniors by the Education Act, 1944 (at the firm's expense) it is wisest to limit trade apprentices' class compulsion to the same age, by which time a reasonable opportunity has been afforded most lads to obtain the Ordinary National Certificate. Technical apprentices must, of course, continue to the Higher National, and, if possible, well beyond.

Tuition Costs

The provisions of the Education Act, 1944 must not be overlooked. Planning must be made against whole-day absences as soon as the Minister of Education declares the "appointed day"; the fact must be faced that such education will be free of cost to the apprentice, while, in parallel, his evening school is not; and, again, that only one-half of his (coming) whole-day tuition will be technical. Thus the firm is almost bound to pay evening school fees. There follows the cost of textbooks, stationery, etc., all adding to the detail to be handled by the apprentices' supervisor. Furthermore, the possibility of compassionate grants, and the inquiries essential thereupon, complicate this part of the picture appreciably.

The new Act, moreover, raises the school-leaving age by one year. This means that, for the year in which the "appointed day" occurs, there must be a sharp drop in possible apprentice input, and the same will recur when the leaving age rises to 16. The committee will be led to evolve a system of marking both school and works performances towards a series of annual prizes. To be fair as between types of apprentices, their varying aspirations, attitudes, and factual possibilities, makes a delicate task. A system of marks based on (time × performance) will be found to reduce difficulty to a minimum.

Considerable detail is thus seen to be unavoidable, and must be handled methodically. The committee therefore, at the outset, must lay down its entire scheme in the form of a carefully paragraphed (and decimally indexed) code of standing orders. Suitably subsectioned, this code, adhered to strictly by all parties (including the management), will ensure smooth working and success. Moreover, one section of the code will instruct the supervisor as to the steady compilation of a dossier for each apprentice, covering every movement of the lad, and his results, from start to finish. Out of this dossier system evolve the future members of the firm's own personnel—the satisfactory selection of whom forms the underlying purpose of the whole scheme.

The confidential copy of the code will contain an appendix covering finance. On the basis outlined, an "extracted" scheme will surprise the committee by its small capital and annual charges. In one matter only will the committee require to be particularly pointed, since the management otherwise will likely be easy on cost. Under the "old" training regime an apprentice has usually been trained on specialist lines, *i.e.*, he would make only from three to five training changes within his five years. The new scheme provides for much wider training, involving perhaps from fifteen to twenty changes.

Productive Efficiency

On the old basis the apprentice became useful as an output pieceworker quite early, earning perhaps time and 60 per cent. Under the new scheme he will not reach these earnings until his last years and production costs may therefore apparently rise. Careful analysis will show, however, that his equivalent capabilities correspond, under the new scheme, to about time plus 20 per cent., while, after the lad has completed his time, his production efficiency has become much superior to that which obtained under the old arrangements, so that costs are rather transferred in incidence than increased. But the committee must exercise the greatest care here: the rock upon which many managements wreck the best of training schemes.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Installation Bonding

RECENTLY I installed a 7·5-HP motor to drive a grain-drying machine in a stone-built barn adjoining farm buildings. The wiring to the motor and starter are in heavy-gauge conduit, the whole being efficiently bonded throughout in accordance with the I.E.E. Regulations. The motor, starter and conduit are some distance away from the drying machine, which is driven through long rubber V-belts.

The installation inspector of the local supply authority tested the installation, with particular attention to the earth continuity of the motor, starter, isolator and conduit, and everything was found to be very satisfactory. He then tested the resistance of the drying machine to earth, and found it to be 16 ohms. He insisted that the machine should be bonded in with the electrical installation.

I can well understand the need for bonding all machinery in an explosives factory or in situations where the formation of static would be dangerous, but this particular case is quite beyond me and no reason was given for it. Possibly in the next industrial installation we shall have to bond in with the motor all line shaftings and machines belted thereto! Have any other readers engaged on installation work had a similar experience?

Burton Latimer, nr. Kettering. GERALD G. CHURCH.

Disposal of Surplus

IN your issue of September 21st, reference is made to the fact that plans for dealing with disposal of surplus Government-owned equipment are proceeding very slowly. So far as industrial electrical equipment is concerned this is, indeed, the case. The Association of Electrical Machinery Traders has played its part in negotiations with the Ministry of Supply and to the best of our belief the following are the facts:—

In July, 1944, the Board of Trade issued a White Paper setting out the Government's policy in regard to disposals and shortly afterwards the Machine Tool Control of the Ministry of Supply was charged with the responsibility of conducting negotiations. In December last the department produced an outline scheme and after many months of negotiation with a B.E.A.M.A. Committee a detailed plan was prepared. This Association took the view that the plan was not in conformity with the White Paper proposals and suitable representations were made to the Ministry of Supply detailing our objections and seeking amendments in certain particulars.

This was before the General Election took place, since when no information concerning progress has reached us, albeit attention has been called from time to time to the urgency of the matter. It is hoped that the publicity you have given to the matter will help to speed things up.

London, W.1.

ASSOCIATION OF ELECTRICAL MACHINERY TRADERS. J. T. MORGAN, *Secretary.*

Chief Engineers' Salaries

NOTWITHSTANDING the letter of Mr. W. C. Kennett, I endorse the remarks of "M.I.E.E." regarding the constant discussion of salaries in electricity supply undertakings. The salary of the public supply engineer, whatever his status, is no more important than that of the engineer engaged in industry and private enterprise.

Moreover the I.M.E.A. is the organisation and its journal the agency through which public supply engineers can air their grievances. As it is their salaries are higher than those of engineers in private concerns engaged on work of equal skill and responsibility. UNSHELTERED.

Economy in Large Buildings

IT is apparently regarded as an impracticable step to ration electricity in the same manner as food or clothing are rationed. If this were not so, devices would be introduced that would limit the consumption of electricity over a given period of time, and if the consumption was in excess of that allowed the consumer would be left without a supply until the commencement of the next rationing period. Such procedure is evidently looked upon as too drastic a step to be put into effect, and yet so serious did the situation become last winter that electricity undertakings, at times

of peak load, were obliged to cut off the supply altogether. This had the effect of producing in general what it was considered inadvisable to do in the particular.

There is no reason to believe that the small householder is an offender against unnecessary consumption. Where we do find waste of electricity is in large buildings, either private or public where it is difficult to keep a check on unnecessary consumption unless somebody is employed making a constant tour of inspection, and that is not possible in these days of labour shortage. I believe that those responsible would readily co-operate if they were provided with a means of easily seeing when they were exceeding the limit, as are industrial establishments on a maximum demand tariff.

. This could be achieved with very simple apparatus. Assuming that the supply is AC, a transformer conveniently fitted adjacent to the service meter is necessary, its primary winding coupled to the main circuit. The secondary would supply current at convenient voltage to one or more rectified moving-coil instruments. These instruments which would be of handsome appearance could be of the 6-in. pattern to mount on the wall, or of a small type to stand on the desks of one or two of the executive authorities of the establishment. According to an agreed figure, which could be taken as a percentage of the connected load, a red line would be marked on the scale of the instrument. It would then be possible to see at a glance at any time what was going on anywhere in the premises.

The cost of all this would be almost negligible. Less than £10 would in all probability cover all that was necessary for quite a large building, and it would have the overwhelming advantage of giving the head of the establishment an immediate indication of the position. He would not be dependent upon subordinates for his information.

It is not suggested that executives will have nothing to do but keep their eye glued to a meter all day; but there is every probability that the psychological effect derived from knowing when consumption is excessive will, in the aggregate, have the effect of keeping down the load and dispelling the impression, so prevalent in non-technical minds, that electricity supply undertakings have unlimited capacity at their disposal.

*London, N.W.*10. LESLIE G. TOPLIS,
Associate I.E.E.

Electrical Factories

Plans for Expanded Production

TWENTY-FOUR more Government factories, with a total area of about 4 million sq. ft. and estimated to provide employment for nearly 17,000 persons, have been allocated by the Board of Trade for civilian production. In addition, three Royal Ordnance Factories with a total area of 5¼ million sq. ft. are to be used as trading estates. There are many applicants for space in these and employment for upwards of 12,000 people may be anticipated. Including those already announced in recent months, 117 Government factories, representing an area of approximately 35 million sq. ft. and providing estimated employment for about 220,000 workers, have now been allocated by the Board of Trade for civilian industry and as disposals depots.

Among the latest allocations are the following: A. Reyrolle & Co., Ltd., North Seaton, Ashington, and Hebburn-on-Tyne (total 80,630 sq. ft.), for the production of electrical equipment; Savage & Parsons, Ltd., Watford By-pass (13,000 sq. ft.), for electrical equipment; British Electric Meters, Ltd., Bangor (54,600 sq. ft.), domestic electricity meters; British Thomson-Houston Co., Ltd., Newcastle-under-Lyme (85,600 sq. ft.), electrical appliances; D. Napier & Son, Ltd., and English Electric Co., Ltd., Walton, Liverpool (1,308,000 sq. ft.), aero engines and electrical engineering; and Ferranti, Ltd., Crewe Toll, Edinburgh (74,750 sq. ft.), radio sets.

Companies' Programmes

Reyrolle's wartime factory at North Seaton, Northumberland, mentioned in the foregoing note, is to be devoted to the production of vacuum cleaners and lighting equipment.

W. T. Henley's Telegraph Works Co., Ltd., inform us that they have acquired an up-to-date factory at Birtley, co. Durham, for the manufacture of their cables. The company's factories at Gravesend and Woolwich are in no way affected and will continue production as at present.

Santon, Ltd., are building a 50,000 sq. ft. factory near their existing works at Somerton, Newport, for the manufacture of their water-heating equipment and rotary switches.

On September 28th, Mr. Tom Johnstone, former Scottish Secretary, cut the first sod on the site of a new factory which is to be erected at Airdrie, Lanark, for Vactric, Ltd., for the production of vacuum cleaners, washing machines and other domestic electrical appliances. Mr. Johnstone is reported to have said that the Board of Trade was sinking some £500,000 in this project.

The Board of Trade has granted a licence to Philips (Blackburn Works), Ltd., to proceed with the erection of a new factory. It is stated that later a larger site is to be developed by the company.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AN advertisement appears in this issue inviting applications for the appointment of director of the British Electrical & Allied Industries Research Association (E.R.A.). It will be recalled that **Mr. E. B. Wedmore** retired from the directorship at the end of last year and since then **Dr. S. Whitehead,** assistant director of the E.R.A. laboratories has been acting director, **Mr. R. A. McMahon** being secretary. The salary offered is £2,500 per annum and the successful applicant should be able to take over early in 1946, or sooner if possible.

Among other vacant positions advertised in this issue are the following:—Deputy chief electricity and transport engineer for Ipswich Corporation (£900-£50-£1,000); chief assistant engineer for Central Sussex Electricity, Ltd., and associated companies (£800); power station assistant engineer for Fulham (£717); and temporary meter superintendent for Birkenhead (£517).

The St. Helens Borough Council has approved the appointment of **Mr. J. Mills** as deputy borough electrical engineer. Mr. Mills received his technical education at the Manchester College of Technology, of which he is an associate, and his training with the Lancashire Electric Power Company. Subsequently he held the position of generating engineer with Bradford Electricity Department until he was appointed power station superintendent with the St. Helens Corporation. He is an associate member of the Institutions of Electrical and Mechanical Engineers, and a member of the Institute of Fuel.

Mr. Robert Lee, chief electrical engineer and manager at St. Pancras, reaches the retiring age in December, when he will have completed forty-two years in the electricity supply industry —fourteen in his present position at St. Pancras. Recommending that he should be re-engaged in a temporary capacity, the Electricity Committee records its appreciation of the services which Mr. Lee has rendered to the borough.

On his retirement from the position of borough electrical engineer of Stockport **Mr. G. H. Oldroyd** was recently presented with a wallet containing notes at a gathering of employees of the undertaking and members of the Electricity Committee, the presentation being made by the Mayor (Councillor W. J. Davies). Mr. Oldroyd joined the Stockport undertaking as switchboard attendant in 1907, after having served at Heckmondwike, Dewsbury, Kilmarnock and Batley. Later he was appointed station superintendent and then deputy electrical engineer before becoming borough electrical engineer in 1931. He is succeeded by his deputy, **Mr. W. R. Allcock.**

Capt. Oliver Lyttelton, M.P., has been appointed chairman of the board of Associated Electrical Industries, Ltd., in succession to **Sir Felix Pole,** who is retiring on account of eye trouble but remains on the board as deputy-chairman. Capt. Lyttelton has held a number of Government posts, including that of Minister of Production, and he was President of the Board of Trade in 1940-41 and again in Mr. Churchill's "Caretaker Government" this year. He was previously

Capt. O. Lyttleton

Sir Felix Pole

Controller of Non-Ferrous Metals (1939-40) and he has been managing director of the British Metal Corporation, Ltd.

Sir Felix Pole had been chairman of A.E.I. since its formation in 1929. Before that he was general manager of the Great Western Railway. He has served on commissions and committees dealing with many subjects.

Mr. E. C. Holroyde, chairman of the B.E.A.M.A. Council, is a member of the party of industrialists which is visiting France (and later Italy and Switzerland) under the auspices of the Federation of British Industries.

Mr. George Wansbrough, chairman of A. Reyrolle & Co., Ltd., has been appointed to the committee which is to advise the Treasury upon financial assistance for industries set up in "development" areas. Another member is **Mr. W. L. Tregoning,** a director of the Jackson Electric Stove Co., Ltd.

Rear-Admiral G. P. Thomson, whose appointment as chief press censor has terminated, has accepted a position with Cable & Wireless, Ltd., and will undertake duties connected with the handling of press traffic.

Air Vice-Marshal C. W. Nutting, who has been Telecommunications Adviser to the Minister Resident in the Middle East, has also joined the combine and is to undertake special missions overseas.

The Scottish Advisory Committee of the Electric Lamp Manufacturers' Association made

a presentation recently to its secretary, **Mr. M. W. Hime,** A.M.I.E.E., F.I.E.S., who has resigned to become public lighting engineer to the Yorkshire Electric Power Co. Mr. Hime has held the office of secretary for the past eight years in conjunction with that of district engineer of the Lighting Service Bureau of Scotland. The presentation took the form of a silver bowl subscribed for by the different sections of the electrical industry represented on the Committee. Tributes were paid to the work done by Mr. Hime in various spheres.

The earlier part of Mr. Hime's training was received in the development laboratories of the General Electric Co., Ltd., Witton, Birmingham, followed by experience in the test department of the British Thomson-Houston Co., Ltd., from which he joined the E.L.M.A. in 1934. Amongst his work was the co-ordination of the Electric Illuminating Exhibition at the Science Museum, South Kensington.

Mr. G. K. Palmer, A.M.I.Mech.E., M.I.A.E., M.Inst.T., has been appointed assistant managing director of Brush Coachwork, Ltd., Loughborough. Mr. Palmer's first appointment was with the Harrow Electric Light & Power Co. During the 1914-1918 war he held a commission in the Royal Engineers and the Royal Flying Corps, and was mentioned in despatches. In 1920 he joined the Birmingham and Midland Motor Omnibus Co. and was appointed assisistant chief engineer in 1921; in 1931 he went to Crosville Motor Services, Ltd., and in 1939 was appointed acting chief engineer, which position he has left to join Brush Coachwork, Ltd.

Mr. G. K. Palmer

Mr. H. S. Rentell has recently joined the staff of the Jackson Electric Stove Co., Ltd., as publicity manager.

Mr. S. E. Harvey-Barnes has resumed his duties as director and electrical manager of Gothic Electrical Supplies, Ltd., after six years in the Royal Air Force.

Mr. O. H. Buckingham has been appointed a director of the Hotpoint Electric Appliance Co., Ltd. Mr. Buckingham joined the staff of the British Thomson-Houston Co., Ltd., Rugby, in 1912, and has been general manager of the Hotpoint Co. since 1932. **Mr. N. V. Everton,** sales manager, Lamp Department, of the Metropolitan-Vickers Electrical Co., Ltd., has also joined the board of the Hotpoint Co.

Mr. W. H. Higham, head of the staff payroll department of the British Thomson-Houston Co., Ltd., Rugby, has retired after more than forty-four years' service. He joined the cashier's department in 1901 and has held his present position since the department was instituted in 1925. **Mr. A. E. Browne,** who has been appointed to succeed Mr. Higham as from October 1st, joined the company in 1909 and worked in the cashier's and accounting departments until he joined the Army in 1914, seeing service in France and Belgium. On demobilisation in 1919 he rejoined the B.T.H. cashier's department at Rugby, and in 1925 was appointed chief assistant to the head of the staff payroll department.

Squadron-Leader B. R. Sankey, A.M.I.E.E., who joined the R.A.F. (Technical Branch) in 1940, has been demobilised this week and is returning to the International General Electric Co. of New York, Ltd. S/L Sankey was mentioned in dispatches in 1942.

On Friday **Mr. Oscar C. Waygood,** O.B.E., M.I.E.E., consulting engineer to Lewis's, Ltd., left for a business tour in America and Canada. He will be away for eight weeks.

Mr. W. M. Rogerson, managing director of the Stella Lamp Co., Ltd., has now been with the company for twenty-five years. A luncheon was held at the Waldorf Hotel on September 15th to celebrate the occasion and was attended by the senior staff of the company and others from the Philips group of companies. Mr. S. S. Eriks, managing director of Philips Lamps, Ltd., presided. Mr. Rogerson is one of the veterans of the electric lamp industry in which he has had forty-five years' service.

Mr. N. S. Richardson has been appointed manager of the Sales Service Department of Alliance Wholesale, Ltd., London, and commenced his duties on October 1st.

Major W. Gordon Martin, R.A., has been released from military service and is taking up his appointment as A. Reyrolle & Co.'s area manager for Scotland. Major Martin has spent the last three and a half years in S.E.A.C. His father, the late Mr. David Martin, represented Reyrolles in Scotland for over thirty years.

Mr. C. E. Stott has retired after twenty-five years service with A. Reyrolle & Co., Ltd. He joined Reyrolles as engineer in charge of switchgear contracts for the London Area and South-East England, and later extended his responsibilities to other areas. He actually reached retiring age in 1944, but agreed to continue in the company's service until the end of the war.

Mr. W. E. Jewell, manager of the contracts department of Falk, Stadelmann & Co., Ltd., completed fifty years' service with the company on September 5th. He joined the office staff of the company in 1895 and later was attached to the contracts department, of which he took control during the 1914-18 war. Under his management the department has been considerably extended.

Mr. J. H. Child has just retired from the post of district electrical engineer, L.N.E.R. Parkeston Quay, in which position he was

responsible to the electrical engineer, Southern Area, for the electric lighting and power installations in the Eastern Counties part of the system, including particularly the port installations at Parkeston Quay. The whole of Mr. Child's railway service was spent at Parkeston Quay, where, after gaining some experience in the United States, he was appointed foreman in October, 1904, and successively assistant district electrical engineer, resident engineer and district electrical engineer.

Mr. J. Pritchard, who has been concerned with post-war domestic heating questions in the Ministry of Fuel and Power, has joined Bratt Colbran, Ltd., and will be responsible for the development and sale of fuel-burning appliances for gas, electricity and solid fuel.

Mr. E. J. Nicholls, the York city electrical engineer, is to retire on reaching the age of sixty-five next February.

Sir George Paget Thomson, F.R.S., has accepted an invitation of the Council to become president of the Junior Institution of Engineers for 1945-46. **Major-General K. C. Appleyard,** C.B.E., T.D., the retiring president will induct Sir George Thomson at a meeting to be held in the Institution Lecture Room on Saturday, December 8th, at 2.30 p.m. when Sir George Thomson will deliver his presidential address entitled " Atomic Energy."

Sheffield Corporation Electricity Committee recommends the appointment of **Mr. I. D. Campbell,** generation engineer, Hull Corporation, as deputy general manager at a salary of £1,100 per annum.

Mr. H. Watson, general manager of the Sheffield Corporation Transport Department, has retired after forty-six years' service and **Mr. R. C. Moore,** now deputy, has been promoted to the vacancy at a salary of £1,500 per annum.

Mr. A. M. Mulliner, A.M.I.E.E., borough electrical engineer and manager of Middleton (Lancs) since 1924, has retired owing to ill-health.

Mr. L. M. Butler, assistant manager of Walsall Conduits, Ltd., has been elected a director of the company.

Belfast Transport Committee of the Corporation last week placed on record its appreciation of the services of **Mr. Samuel Carlisle,** deputy to the general manager and engineer, Lieut.-Col. M'Creary. Mr. Carlisle is about to retire after forty-five years' service with the Corporation, practically all of it in close association with the transport branch, and the last six years as acting general manager while Lieut.-Col. M'Creery was on active service.

Mr. J. S. Wills, an executive director of the British Electric Traction Co., has been elected chairman of the Council of the Public Transport Association.

Mr. G. E. Turner, assistant station engineer in Blackburn electricity undertaking, is retiring on superannuation on November 27th, after forty-three years' service.

Mr. A. M. Hicks, general manager and secretary of Siemens Electric Lamps & Supplies, Ltd., retired on September 30th, after forty-five years' service in the Siemens organisation. He is succeeded by **Mr. C. J. N. Borg. Mr. J. R. Naish** has been appointed assistant secretary of the company.

Mr. H. King, assistant commercial manager, Ilford Corporation Electricity Department, has retired after forty-five years' service.

A presentation has been made by the staff of the Shotley Bridge & Consett Gas Co. to **Mr. A. G. I. Anderson,** general manager, who has been appointed general manager of the Bognor Regis Gas & Electricity Co.

Mr. Charles Pickering, commercial and managerial assistant, Barnsley Electricity Dept., is to retire after forty-four years with the undertaking.

Obituary

Mr. S. J. Benham.—We regret to learn of the death on September 26th, after a long illness, of Mr. Stanley J. Benham, at the age of seventy. Mr. Benham joined Benham & Sons, Ltd., in 1892 and became a director in 1899 and managing director in 1901. He was still chairman at the time of his death. In 1909 he became chairman also of James Slater & Co. (Engineers), Ltd. He was responsible for the design and equipment of steam cooking plant for all Dreadnoughts and for battleships, battle cruisers and cruisers from 1904 to 1918. During the second world war he was responsible for the design and equipment of the canteen kitchens for all Royal Ordnance Factories and their hostels, and he was intimately connected with similar work for War Department camps.

Mr. J. Y. Fletcher.—There was a large gathering at the funeral service for the late Mr. J. Y. Fletcher at Christ Church, Virginia Water, on September 26th. The General Electric Co. was represented by Sir Harry Railing (chairman), who was accompanied by Lady Railing, Mr. L. C. Gamage (vice-chairman) and the Hon. Mrs. Gamage, Dr. C. C. Paterson, G. Chelioti and F. Winstanley (directors), and Mr. T. Dyke (joint secretary), as well as many members of the staff.

Mr. R. Tervet.—We regret to report the death on September 18th of Mr. Robert Tervet in his sixty-ninth year. Mr. Tervet entered the service of the Fowler-Waring Cable Co. in 1894 and continued in service with the Western Electric Co. when the latter took over the business in 1898. In 1908 he joined the London Electric Wire Co. & Smiths, Ltd., in whose service he remained up to the time of his retirement in 1940, with the exception of a few years when he was with the Concordia Electric Wire Co.

The Adelaide Company

Commission's Recommendations

IN December last year the South Australian Government appointed a Royal Commission to inquire into the operation of the Adelaide Electric Supply Co., Ltd., and to report whether further legislation was necessary. Mr. Justice Reed was chairman and the other members were Mr. J. W. Wainwright, State Auditor-General (nominated by the Treasurer), and Professor A. L. Campbell, Bonython Professor of Law, Adelaide University (nominated by the company).

A unanimous report was issued by the Commission in August and a summary of this has been circulated by the company to stockholders. In this the Commission recognises that the management has been efficient and economical and the supply, on the whole, has been adequate and according to recognised standards. The preference dividends are considered liberal and the Commission says that the issue of preference shares at a high rate of dividend is not a wise policy. The ordinary dividend was 12 per cent. from 1911 to 1930, 10 per cent. from 1934 to 1944 and it appears that the rate will not exceed 7 per cent. for some years. The rates of interest on debentures are reasonable.

Fair Charges

The company's charges are considered to be fair; they cannot be reduced unless the tax burden is eased or coal prices are lowered. It is suggested that future capital at Treasury rates would result in reduced capital costs and lower charges. It is thought that the freedom of the company to expand its area or to refuse supplies militates against the development and co-ordination of supplies throughout the State.

The Commission recommends that the assets and liabilities of the company in South Australia should be acquired by a "South Australian Electricity Trust," the price to be based on the market value of the shares at August 1st, 1945. Employees of the company would be given the right to continue their employment at their existing rates of salaries and wages and on the same conditions. Capital for the undertaking's future operations would be raised at current Treasury rates.

If the recommendation for acquisition is not carried into effect the Commission recommends the fixing of the company's charges by regulation and a three-yearly inquiry into the company's affairs. Another recommendation is that the State Electricity Commission should at once hold an inquiry into the co-ordination of supplies throughout the State and that in the meantime it should have the right to veto further extensions.

In the opinion of the directors of the company the inquiry did not disclose any ground for suggesting that the public interest had not been fully safeguarded by the company. It is not considered that the fact that the company has to carry a heavy tax burden is sufficient reason for taking over the business. The proposed terms of purchase would involve the debenture and preference stockholders in a heavy loss; the purchase price should be the present capital value of the undertaking and not the market value of its shares. It is mentioned that the Government already has the power to regulate prices but after repeated investigations has not found it necessary to use this power.

The directors say that they have no indication of the Government's intentions regarding the report but every possible step is being taken to safeguard the stockholders' interests.

Measuring Appliance Saturation

SAMPLING tests designed to give an indication of certain electrical statistics of a large body of consumers by examination of a relatively small sample are described in a report just issued by the Electrical Research Association, ref. K/T.113, entitled "Measurement of Appliance-Saturation Factors by Means of Sampling," by J. R. Isaac and G. O. McLean, 15s. 6d.

Tables and graphs illustrate the effect of the magnitude of the saturation factor and of the sample size on the accuracy of the estimate. The procedure recommended distinguishes between bulks well above 20,000 consumers and smaller ones. In the former case the minimum sample size is 500 consumers, whereas for the latter guidance is given for the reduction of the size of sample. In both cases the sample is drawn by picking out consumers' record cards at equal quantitative intervals, as determined by the relation between bulk size and chosen sample size. An example of the application of the theory is provided with the aid of a collection of 20,000 actual consumers' inventories.

Assistance for Development-Area Firms

THE appointment is announced of the Development Areas Treasury Advisory Committee which is to examine applications for financial assistance from concerns proposing to set up industrial undertakings in the "development areas" specified in the Distribution of Industry Act, 1945. The Committee will recommend that assistance should be given if it finds that there are good prospects that the undertaking will be able to carry on without further help under the Act and that those concerned cannot obtain the necessary capital on reasonable terms from other sources.

Firms seeking to qualify for assistance must first obtain the approval of the Board of Trade (Assistant Secretary, Control of Factory and Storage Premises, Millbank, S.W.1) as complying with the provisions of the Act. Applications for assistance should then be addressed to the Secretary of the Committee, Treasury, Great George Street, S.W.1.

Merging of Sciences

Influence of Physical Research

THE merging of the sciences in electrical engineering was the theme of the inaugural address of Dr. J. L. MILLER (British Insulated Callender's Cables, Ltd.) as chairman of the North-Western Centre (Manchester) of the Institution of Electrical Engineers on Tuesday last.

It was pointed out that the blending of the sciences had been greatly accelerated during the last twenty years, so that electrical research had become more physical in character, and engineering designers were now utilising, more frequently and with less delay, the results of such research.

One of the reasons, which Dr. Miller examined, was the paramount necessity of obtaining solutions to problems arising out of the increases which took place after the last war in the ratings and voltages of plant. In the main these solutions required the help of the physicist which, in turn, brought research departments into greater prominence, so adding further impetus to progress. Then, too, the effect on advance of nation-wide electrical schemes, like the C.E.B., must not be forgotten and the influence of physical research during wars was a further prompting. Additionally, developments in radio and electronic technique had powerful repercussions on all branches of electrical engineering. In radio particularly, engineering and physics were so inextricably interwoven as to create an industry of applied physics.

Applications of Electronics

Dr. Miller then went on to deal with two specific branches of electrical engineering in which the physicist was very directly concerned indeed. Electronics, for instance, had found its most obvious application in telecommunications; nevertheless it had also had a profound influence, sometimes almost as an industrialised branch of applied physics, in other fields.

Measurement was a case in point. Apparatus for the measurement of small quantities, the X-ray tube, X-ray diffraction equipment and the electron microscope were having a marked effect on engineering progress, while the cathode-ray oscillograph had become an indispensable electronic measuring device. Without it, progress in power transmission, switchgear, radio and television would have been long delayed. Then on the industrial side proper there were the electronic control of resistance welders, heating by high-frequency AC, the mercury arc and ignitron types of rectifier.

As regarded insulation the physicist had not at first sight played such a direct role. In the main his practical contribution in this field had not really extended much beyond the development of measurement techniques and the provision of data about phenomena. Such work nevertheless had enabled the engineer as progress continued more adroitly to choose the most suitable material, more consistently to process it and more accurately to incorporate it in the overall design of equipment.

Calculation Without Measurement

The electric cable industry was a good illustration. But if the physicist had not played a direct practical role in insulation, the position might drastically change in the future. It was to-day possible to calculate, using the latest theories of molecular structure, without recourse to a single electrical measurement and from thermal data alone, the permittivity, loss factor, temperature and frequency relationships for a group of simple dipolar substances. Further, for a large group of crystalline substances the breakdown voltage could be calculated from optical data alone.

Such physical research could not yet be extended to include synthetic polymeric substances. Nor could it have important repercussions on existing insulating materials as paper, cotton and varnish, but having regard for the advances which were being made towards an understanding from the chemical point of view of the influence of the molecular structure on the electrical behaviour of existing synthetic materials, it was quite possible that in due time the molecular physicist and the chemist would have so far advanced their techniques that they would be able to present materials which would have a molecular structure specifically designed to satisfy at least some of the requirements of the engineer.

The physicist and the chemist had already proved their worth as important specialists in electrical insulation. If and when they attained the ultimate goal, they would become

essential parts of this branch of electrical engineering. No one could guess where such progress would lead, but certainly great benefits would accrue.

In concluding, Dr. Miller reviewed some of the administrative, research and educational difficulties which arose out of the growing number and wide range of sciences and techniques that were to-day included in electrical engineering. Among the points he raised were that the universities should be assisted to increase their volume of fundamental work, that industry should increase its own quota of such work, that many of the university courses in electrical engineering and physics needed overhauling and, an increasingly difficult problem, that industry itself must ensure a full flow of individuals, with the necessary breadth of view and capable of appreciating the impact of science on industry, to fill the higher technical posts in the future.

Forthcoming Events

Friday, October 5th.—*London.*—Institution of Mechanical Engineers, 5.30 p.m. First James Clayton Lecture: "The Early History of the Whittle Jet Propulsion Gas Turbine," by Air Commodore Frank Whittle, C.B.E.

Newcastle-upon-Tyne.—Neville Hall, Westgate Street, 6.30 p.m. I.E.E. North-Eastern Students' Section. Chairman's address by H. Hilton.

Manchester.—Engineers' Club, 6.45 p.m. Manchester Association of Engineers. Presidential address by C. S. Youatt.

Saturday, October 6th. — *Manchester.* — Engineers' Club, 1.15 p.m. I.E.E. North-Western Students' Section. Luncheon (tickets 5s.) followed at 2.30 p.m. by chairman's address on "The Place of the Gas Turbine in Future Electricity Generation," by B. V. Poulston.

Leeds.—Electricity Offices, Whitehall Road, 2.30 p.m. I.E.E. North Midland Students' Section (jointly with students of the Institution of Civil Engineers, Yorkshire Association). "Some Recent North American Hydro-Electric Projects, with special reference to the Boulder Dam," by W. A. Hatch, M.B.E.

Monday, October 8th.—*London.*—Caxton Hall, S.W.1. Institution of Rubber Industry, 6.30 p.m. "Electrically-Conductive Rubber," by D. Bulgin.

Newcastle-upon-Tyne.—Neville Hall, Westgate Street, 6.15 p.m. I.E.E. North-Eastern Centre. Chairman's address by W. Dixon.

Tuesday, October 9th.—*London.*—School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6 p.m. Illuminating Engineering Society. Induction of new president, H. C. Weston, and presidential address. (Refreshments, 5.30 p.m.)

Leeds.—Electricity Offices, Whitehall Road, 6 p.m. I.E.E. North Midland Centre. Inaugural address by A. Kelso, chairman.

Wednesday, October 10th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Radio Section. Chairman's inaugural address by A. H. Mumford, B.Sc. (Eng.).

London.—E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, Strand, 5 p.m. Illuminating Engineering Society. Exhibition of film, "Let Us See" (Lessons in Industrial Lighting).

Thursday, October 11th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Installations Section. Inaugural address of the chairman, Forbes Jackson.

Cardiff.—Electricity Offices, The Hayes, 6.30 p.m. Electrical Power Engineers' Association (Western Division). "A Modern Earth-Fault Relay Equipment for Use on Systems Protected by Petersen Coils," by L. S. B. Golds.

Exeter.—I.E.E. Devon and Cornwall Sub-Centre. Royal Clarence Hotel, Exeter, 3 p.m. Inaugural address by the chairman, P. S. Grant.

Friday, October 12th.—*London.*—St. Stephen's Tavern, Bridge Street, Westminster, 6.30 p.m. E.P.E.A. Meter Engineers' Group (Southern Division). "Meter Jewels and Pivots," by G. F. Shotter.

Manchester.—Engineers' Club, 6 p.m. I.E.E. North-Western Centre Radio Group. "Studio Technique in Television," by D. C. Birkinshaw, M.B.E., M.A.

Saturday, October 13th.—*Manchester.*—At Geographical Society, 16, St. Mary's Parsonage, 2.30 p.m. Junior Institution of Engineers (N.W. Section). Annual general meeting and presidential address by L. H. A. Carr, M.Sc.Tech., M.I.E.E., on "The Engineer's Tools—Words and Figures."

Monday, October 15th.—*London.*—Institution of Electrical Engineers, 7 p.m. London Students' Section. Chairman's address by H. Shorland, B.Sc. (Eng.), on "Tuning Forks."

Birmingham.—Grand Hotel, 6 p.m. Birmingham Electric Club. "Technical Education in the Present and Immediate Future," by C. F. Partridge, B.Sc., M.I.E.E.

Tuesday, October 16th.—*London.*—Lighting Service Bureau, Savoy Hill, 6.15 p.m. Association of Supervising Electrical Engineers. Presidential address by E. R. Wilkinson, M.I.E.E., preceded at 5.45 p.m. by short films on "The Atom" and "The Face of Britain (The Grid System)."

London.—At Institution of Electrical Engineers, 2.30 p.m. British Society for International Bibliography. Induction of new president, Dr. S. C. Bradford, presidential address on "Fifty Years of International Documentation," and discussion on "Technique of Making Abstracts of Scientific and Technical Papers," to be opened by Eng. Comdr. D. Hastie Smith.

Manchester.—Engineers' Club, 6 p.m. I.E.E. North-Western Centre Installations Group. "Modern Electric Lift Practice," by L. S. Atkinson.

Cardiff.—At South Wales Institute of Engineers, 6.30 p.m. I.E.E. Western Centre (jointly with Civil and Mechanical Engineers). Discussion of the Report on the Severn Barrage Scheme to be introduced by Sir William Halcrow and S. B. Donkin. Admission by ticket only.

Technical Education

Laboratory Equipment : Value of College Engineering Societies

SOME aspects of technical education, of a more domestic and practical character than those already discussed officially, formed the subject of the inaugural address at Cardiff last Monday of Mr. J. B. J. HIGHAM (School of Mines and Technology, Treforest) as chairman of the Western Centre of the Institution of Electrical Engineers.

Starting with a criticism of the manner in which machines and testing equipment were arranged in the laboratories of technical colleges, the chairman remarked that local education authorities should be prepared to spend the money necessary to equip the various departments properly. But there had been cases of large sums of money being spent on schemes which were too elaborate in the first instance; in a number of institutions large space had been provided in which apparatus had been spread about indiscriminately without being properly planned because its disposition had been left to a contractor.

Room for Development

A laboratory should never be filled in "one grand effort" without leaving room for development, which was best decided by experience. The installation of unnecessarily large machines, too firmly fixed on massive foundations, often caused reluctance to scrap old and obsolescent plant. The present contrasting tendency to install machines under benches carrying test instruments was even worse, having regard to the necessity for easy access and free inspection.

In the early stages of their laboratory work students should themselves connect up the machines and instruments they used. For more advanced work the provision of properly wired test tubes was recommended, to save time and reduce risk of damage to costly instruments.

There was no intention to spoon-feed students, but many of them looked upon practical work as a period in which to ease off, whereas it was one of the most important parts of their training. Twice the time usually spent on laboratory work would not be too much and it had become more than ever necessary to keep apparatus up to date. The argument that industry should find the money would not bear scrutiny and the practical side was so important that it must be kept constantly in mind in all general plans for reform.

The cost of adequately equipping scattered small institutes conducting evening courses would be prohibitive; an alternative would be the provision of mobile touring laboratories and a common syllabus for laboratory work in institutes acting as feeders to technical colleges.

Importance of English

Mr. Higham next directed attention to the need to train students to express their thoughts plainly in simple English at an earlier stage than is often done. To allow students to progress to the ordinary, and sometimes higher, National Certificate stages before they had satisfied the I.E.E.'s requirements in respect of the English language was equivalent to putting the cart before the horse: extremely poor handwriting was also very evident.

Students were urged to give more support to college engineering societies, which offered excellent opportunities for learning how to conduct meetings properly, how to express ideas in public without self-consciousness, and how to argue and discuss matters in an orderly way. There was need for the amplification of certain advanced lecture work by short discourses to be delivered by engineering specialists, preferably from local manufacturing concerns, with ample time allowed for discussion to follow.

The Use of Films

Cinematograph films could be utilised to great advantage in amplification of, but not to replace, formal lecture work. Only under exceptional circumstances should lecture-demonstrations be used as an alternative to laboratory work; their proper function was to amplify and they needed much more care and thought in preparation.

Mr. Higham demonstrated a simple device for use in conjunction with a cathode-ray oscilloscope, whereby many transient electrical phenomena could be illustrated, thus avoiding the need for elaborate and expensive apparatus.

Design and Maintenance

Too-Frequent Inspections and Overhauls

By J. H. M. Sykes

A VIEW that is expressed, perhaps somewhat vaguely, at nearly every gathering at which maintenance engineers are present is that designers of modern electricity supply plant are tending more and more to unload many of their responsibilities on to maintenance staffs. Every successive design is accompanied by instructions which stress the necessity for regular maintenance to more and more details at shorter and shorter intervals.

Whereas old instruction books frequently said: "This component needs only a semi-annual inspection" and "It should not be necessary to overhaul this (detail part) more than once in twelve months," the newer books are full of such exhortations as: "Grease this bearing at three-monthly intervals," "After every fault clearance the breaker should be thoroughly overhauled" and "The air conditioning device should be inspected weekly." British Standard Code of Practice B.S. 1086/1942 mentions many switchgear items which need three-monthly attention.

Closer contact between designers and users would obviate a good deal of maintenance work or, at least, increase the intervals between essential inspections. Designers should consider maintenance expenses as well as initial cost

Too Many Auxiliaries?

Every new design, while possibly simplifying the apparatus which performs the main function, like breaking the circuit or regulating the voltage, seems to bring in its train endless auxiliaries which all need monthly, weekly, or even daily attention. There are always *more* grease nipples, auxiliary switches and contacts. Breathers, contactors, air safety valves, anti-condensation heaters, automatic fire-fighting gear and the like are always being added.

This condition is the opposite of that which holds good in the automobile industry. Here the designer says in effect: "I give you the latest device for the purpose you require; I ask you to do the irreducible minimum of maintenance and I aim to make this less each year. I fit accessories which are moulded or welded assemblies and which I instruct you to replace *in toto* in the unlikely event of their failure; but I also stress this point—the product is cut to the smallest possible price and I expect to produce a new model next year or the year after; and I expect you to scrap your existing machine and buy a new one when this becomes available."

This, of course, is a very different viewpoint from that of the switchgear and transformer designer, and in any case could not be applied as it stands to the electricity supply industry. But it is open to question whether or not a partial change towards this policy would not be an excellent thing.

A motor-car is a piece of apparatus on which lives depend every minute it is in operation; and a supply transformer's function, though vital, cannot claim a higher "priority" than life. There are millions of motor-cars and millions of distribution switches and transformers; the average price of the car would probably work out quite near that of the average transformer. If something of the basic principles in the light of which automobile engineers commence their designs were applied to the switch and transformer, some advantage might accrue.

The present state into which power supply plant designers have drifted is attributable in the main, to over-specialisation. The designer, in general, seldom visits the sites on which his plant is installed; he knows that it will, in the testing station, perform the functions for which it was intended, but he has been gradually placed in a position so remote from the influence of operating conditions that he ceases to take much interest in its behaviour once it is satisfactorily installed.

Design and Practice

Suggestions for remedying this state of affairs fall into two categories. The first is the desirability of the designer being in closer contact with site conditions not only at the time of erection but also after three or four years have passed. He should be able to talk freely with the maintenance staff, and have access to the necessary records. Only in this way would their difficulties be brought home to him. He would hear of inaccessible auxiliary switches, of covers with a multitude

of unnecessary bolts which try the temper and absorb valuable time, and he would gain some idea of the time important commercial circuits have to be out of commission for maintenance.

The second suggestion is aimed at the designer's outlook when he develops a new design. If a new principle, or the application of a new development (such, for instance, as the extended use of plastic materials) is before him, he should first decide whether the lessened cost of the initial installation will not be offset, in ten years' time, by increased total maintenance costs. Although he will obviously not have to pay these costs himself, the undertaking with an up-to-date costing system will soon come to realise their significance, and these increased costs will ultimately militate against the manufacturer's reputation.

Lighting "Phoenix"

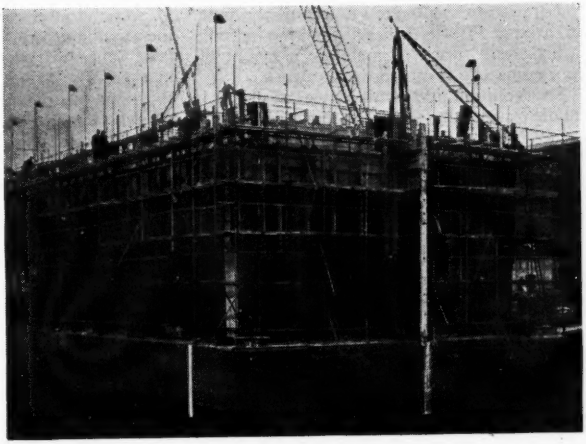
How Continuity of Work was Achieved

By *Brig. P. W. L. Broke-Smith*, C.I.E., D.S.O., O.B.E.
and *F. A. Hulcoop*, A.M.I.E.E., F.I.E.S.

AMONG the largest components of the "Mulberry" prefabricated port were some 150 reinforced-concrete breakwater units manufactured under the code word "Phoenix." Each of these units, which were constructed in the form of open-topped vessels, had bases, side walls and sloping ends 15 in. thick with a central longitudinal partition and ten transverse partitions 9 in. thick, forming twenty-two bulkheads. They provided the outer wall of the harbour, and varied in size from the largest type, 204 ft. long, 56 ft. wide and 60 ft. high, weighing approximately 6,000 tons, to the smallest which was 175 ft. long, 28 ft. wide and 25 ft. high, weighing about 1,670 tons.

The project was commenced in October, 1943, and the need for continuous working entailed the provision of external lighting which, since nearly all the constructional sites were situated in areas vulnerable to enemy air attack, *viz.*, dry docks, basins and shore sites, called for special designs. In dry docks adequate materials-handling facilities existed, but basin and shore sites had to be equipped with plant including cranes, hoists and concrete mixers. Basins were scattered on both banks of the Thames between the London dock area and Rainham, Essex, and were formed by excavating an area approximately 220 by 150 ft. to a depth of 15 to 20 ft., in which two units could be accommodated side by side.

It was intended to do this part of the work by scrapers, and lighting fittings, mounted on 20-ft. poles round the periphery of the area, were installed. Owing, however, to heavy autumnal rains, a change was made to bucket excavators, drag lines and dumpers, with portable local lighting at the working points, assisted by masked headlamps on the various machines and vehicles. When the basin was completed the floor was floated



Arrangement of "scuttle" type lighting fittings on an almost complete "Phoenix" unit

over with a thin cement rendering on which 4-in. hollow floor tiles were laid and these, in turn, were covered by a layer of building paper. Shuttering was then placed at the sides and swim ends of the units and the reinforcing bars laid over the base of the craft ready to receive the concrete.

The most satisfactory means of illuminating this stage of the work was by "scuttle" fittings mounted 15-ft. high and spaced along the sides of the units over the points where the transverse walls would, when erected, meet the sides. Two fittings were also placed over the swim ends at each side. This arrangement resulted in fourteen fittings per side and, in addition, a row of fourteen concentrating vitreous-enamelled reflectors, spaced similarly to the "scuttle" fittings, were installed 15 ft. high along the centre line of the units.

Low but Uniform Lighting

By equipping the side fittings with 40-W pearl lamps and the central row with 25-W pearl lamps, an almost uniform illumination value of 0·2 ft.-candle was obtained over the whole of the base. As the side, end, central and transverse walls grew up from the base (an average lift was 3 ft. per day), the lighting fittings were raised to maintain a height of approximately 15 ft. above the work.

The comparatively low value of 0·2 ft.-candle proved, due to its uniformity, adequate for all but the more critical tasks of placing reinforcement and shuttering, for which work shielded handlamps with 15-W lamps were provided. Concreting was normally carried out during daylight, but not infrequently a lift had to be completed after dark. Local switching limited the lighting to areas where work was actually in progress. A value of 0·2 ft.-candle was also adopted for other areas surrounding the basin where concrete mixing, bar bending, etc., had to be carried out. Scuttle fittings with 40-W pearl lamps, mounted 15 to 20 ft. above ground level, were again employed, with additional shielded local lighting.

On cranes, which, in some cases, were fitted with 80 to 100 ft. jibs, a pendulum-hung fitting, damped to prevent excessive swinging in high winds and comprising a vitreous-enamelled concentrating reflector with a matt black skirt 24 to 36 in. deep and 200-W lamp, was installed at the top of the jib so that the load was always illuminated. A screened 15-W lamp in the driver's cab lighted the controls. This lamp was operated from a floor or door switch so that the driver could not vacate his cab and leave the lamp burning.

Wherever possible construction sites were connected to the industrial air-raid warning system; additional facilities were arranged with the Ministry of Home Security, the "purple" or "lights" warning message being transmitted to all sites over constantly manned telephone lines.

Lighting could not have been extinguished without danger, since many men would have been left in exposed positions, some on scaffolding 50 or 60 ft. high, with no means of finding their way to ground level. Where possible, the whole of the site and unit lighting was supplied from an auto-transformer and, on receipt of a warning, the supply voltage was reduced to 30 per cent. of normal, lowering the illumination value to 0·002 ft.-candle which remained in operation for 4 minutes, after which the lighting was extinguished. In a second system voltage was reduced by inserting a resistance into the lighting circuits.

Where neither of the above methods could be applied, full lighting was retained for 15 seconds after receipt of the warning and then extinguished, but routes from the units (and other working areas) to shelters were marked by shaded hurricane lamps which remained in operation throughout a warning period. Similar lamps were also employed at obstructed points under the first two systems, so that the site should not be left in total darkness in the event of supply failure.

Removal for Completion

The units could not be completed at basin sites in view of the excessive excavation work this would have entailed in providing a channel between the basin and the river. The units, when about half their full height, were therefore floated for completion to prepared berths in the London Dock area, this being accomplished by cutting away the bank between the river and the basin at low tide. The rising tide flooded the basin and floated the unit which was then towed to its new berth with the lighting system intact.

The accident rate did not increase when artificial lighting was in use; the total number of fatal casualties for the whole of the "Phoenix" project was twelve, of which two occurred during darkness and were not attributable to insufficient illumination. This result was largely due to the carefully planned lighting installations.

COMMERCE and INDUSTRY

Tax Relief Suggestions. Fulham Munitions "Factory."

F.B.I. and War Taxation

THE Grand Council of the Federation of British Industries has sent to the Chancellor of the Exchequer a report on the "demobilisation" of war taxes prepared by its Taxation Committee. The report aims at giving the Chancellor some guidance as to the priority in which wartime taxes should be abolished or reduced, and it is said that those taxes should first be dealt with which experience shows to act as the gravest deterrents to productive enterprise. The first cancellation should be of those taxes which constitute forced loans which the State is pledged to repay; these are the reduction of personal income tax allowances and the difference between 80 per cent. and 100 per cent. excess profits tax. The latter tax should be repealed at an early date, together with the national defence contribution.

There appears to be every reason for abolishing the purchase tax on goods which are essential to the equipment of houses and it is not a desirable tax to retain for any length of time. It is also of the greatest importance from the point of view of production that there should be some reduction in the standard rate of income tax.

Overseas Trade Statistics

The Board of Trade announces that publication of the detailed monthly Trade Accounts will be resumed in the normal form beginning with the issue for January, 1946. Accounts relating to the first half of 1945 have already been published, and further detailed accounts are to be issued for the first nine months and for the whole year. In addition, a monthly summary (on the lines of those issued during 1940) will be published showing the July and August figures for each group distinguished in the overseas trade statistics, with further summaries for October and November.

Heating New Houses

Representatives of more than a hundred municipal authorities, manufacturers of heating appliances and representatives of fuel producers and distributors will meet at Caxton Hall, S.W.1, on October 19th (10 a.m.), under the ægis of the National Smoke Abatement Society to consider improved heating methods for new houses. The conference will be opened by Mr. C. W. Key, M.P., Parliamentary Secretary to the Ministry of Health.

Radar for Merchant Ships

A conference of scientists and representatives of Government Departments which have had experience of radar used for defensive purposes has prepared a performance specification for a general purpose outfit suitable for use on merchant ships as an aid to navigation. The Ministry of War Transport has communicated the specification to manufacturers and others concerned for their information and guidance in production. The Ministry is also arranging to make available to manufacturers advice on the technical aspects of the specification and to establish a system of certification of approval of designs and prototypes by a Government Department. Meanwhile shipowners who require radar sets are to be provided with sets made for the Admiralty during the war for use in merchant ships carrying officers trained in their use and maintenance. Other forms of navigational aids are being investigated by the Ministry with the assistance of an Advisory Committee.

Sulphuric Acid Prices

Direction No. 4 (S.R. & O. 1945 No. 1170) issued by the Minister of Supply under the Control of Sulphuric Acid (No. 2) Order, 1940, provides new maximum prices for all sulphuric acid of strengths between 136 deg. TW. at 60 deg. F. and 25 per cent. free SO_3 content. The Direction came into force on October 1st.

S.E. London Technical Institute

Special courses in high-voltage engineering and electric circuit calculations are being held at the South-East London Technical Institute, Lewisham, S.E.4. The first commenced on Wednesday last; it is under the general direction of Professor W. J. John, B.Sc., and comprises twelve lectures at the Institute and twelve laboratory periods at the Queen Mary College. The lecturer for the other course, which began on September 28th, is Dr. Tropper. It consists of a revision of advanced mathematics for the first six weeks followed by three separate six-weekly periods covering progressive groups of subjects.

Radio Equipment for Uruguay

The first post-war contract for a new broadcasting station in South America has been awarded by "Radio Rural," Montevideo, to the Marconi Company. The equipment, comprising a 5-kW medium-wave transmitter, is being constructed at the Marconi Works, Chelmsford, to the latest British designs.

Munition Work at Power Station

Fulham Electricity Committee has prepared a report on the manufacture of munitions at the power station during the war. The foreman in charge of munitions was formerly the charge hand of the power station service department, a first aid attendant was trained as a jig and tool fitter and turner, two wiremen transport drivers became tool setters and a substation attendant became a tool setter and operative. The remaining munition workers were women who were trained for the work, either part or whole time. Since the manufacture of munitions ceased many of these women have been engaged on work for the electricity undertaking, such as the repair of boiler furnaces (working inside boilers), the repair of domestic apparatus, etc., and as wiremen's mates on war damage repairs. When there was a heavy demand for the making of tools, jigs and fittings, all the fitters at the

power station volunteered to help by working overtime after their normal working hours.

In the main the existing plant was used, although one or two new tools had to be purchased where the work demanded a high standard of efficiency. One particular tool which proved invaluable in operation was manufactured in 1893 and was bought from a silversmith in Sheffield. The electricity undertaking entered into the work on a competitive basis and although operating as a subsidiary to the power station, it met competition in the usual way and there was no financial loss. A bonus system was introduced for the operatives and tool setters and the whole operation was distinguished by a spirit of keen competition and hard work. Two or three shifts were in operation throughout the day and night according to circumstances, and the staff never left their machines throughout the enemy air raids.

Paint Manufacturers' Organisation

Particulars have been sent us of the Society of British Paint Manufacturers (Amberley House, Norfolk Street, Strand, W.C.2) which has been formed to establish united action for the benefit and advantage of its members. It is also proposed to form "consumer divisions" which will act as a link between manufacturers and their customers for the discussion and solution of common problems. The Society aims at resisting monopolistic tendencies and interference with free enterprise and intends to foster good labour relationships. The president of the acting council is Mr. C. G. Heywood, chairman of Pinchin, Johnson & Co., Ltd.

Mercury Price Reduced

It was announced last week that the price of mercury was to be reduced from October 1st by £38 10s. per bottle (nominally 76 lb.). The existing price for spot metal was about £69. The price just before the war was £16 10s. For some time past the price of mercury here has been about half that ruling in the United States.

Air Mail to Australia and New Zealand

The Department of Overseas Trade announces that pending the re-establishment of unrestricted air-mail services to Australia and New Zealand, the Government has introduced a limited air-mail service for the benefit of business firms to supplement the present service by air to North America and thence by surface route.

E.A.W.'s Twenty-first Birthday

On October 11th H.R.H. the Duchess of Kent will open the exhibition which the British Electrical Development Association has arranged at the Dorland Hall, Regent Street, London, to celebrate the Electrical Association for Women's twenty-first birthday. Following the opening, Sir Stafford Cripps, President of the Board of Trade, will speak at a luncheon given by the E.A.W. to the electrical industry, and there will also be an evening reception.

"Women and Wireless," "A Woman Physicist Looks Back" and "After the Scientist, the Engineer" are three subjects which will be treated in a symposium of speeches at the Institution of Electrical Engineers on October 12th. Sir Robert Watson-Watt will tell of women's vital part in radar in war and telecommunications in peace; Mrs. Kathleen Lonsdale, one of the first two women to be appointed Fellows of the Royal Society, will, from her researches into X-ray crystal analysis, outline the important work done by women scientists behind the scenes; and Sir Harry Railing will explain how the engineer translates into practical workaday facts the laboratory discoveries of the scientist.

The Women's Engineering Society is holding its own annual conference to coincide with the birthday celebrations of its daughter-association, and Miss M. M. Partridge will give her presidential address on "The Next Twenty-One Years."

Women Electrical Workers' Conference

Representatives of the 8,000 women members of the Electrical Trades Union met at Filey, Yorks, on Saturday on the occasion of the first conference of the Union's Women's Section formed last year. Mr. Frank Foulkes, president of the Union, who presided, hoped that in the future the women would not hold their conferences separately but would have representatives at the Union's main conferences. The Union wanted them to take their place so that they could hold the highest office in the organisation. Miss Harris, of Tottenham, was unanimously supported in her plea that married women should be allowed to stay in industry if they wished.

Education in Heating and Ventilating

A booklet entitled "Technical Education in the Heating and Ventilating Industry" has just been published by the Education Board of the industry (secretary, Mr. F. J. Packer, 103, Borough Road, London, S.E.1). It sets out the facilities which are available for the training of heating and ventilating engineers—operatives' and technical courses (with syllabuses) and a scheme for ex-service personnel. Names and addresses are given of the secretaries of the Area Committees of the Heating, Ventilating and Domestic Engineers' National Joint Industrial Council, together with the constitution of the J.I.C. Advisory Committee and of the special committee set up by the Institution of Heating and Ventilating Engineers to formulate the technical course.

Training for Business Administration

The Committee on Training for Business Administration under the chairmanship of Sir Frank Newson-Smith, set up by the Minister of Labour and National Service, was asked to consider the question of training in business administration and salesmanship, to make recommendations about suitable courses of training, and to advise on the best method of receiving recognition of such training.

The Committee has now recommended that a short course of training of about three months, run in association with local educational authorities and commercial and technical colleges, and in collaboration with industry and commerce throughout the country, would be both appropriate and effective. It has also proposed that, wherever desirable, special courses should be arranged in co-operation with particular industrial and commercial groups, to meet the needs of the business groups concerned.

The proposals are designed to train suitable ex-service men and women so as to fit them for employment which will lead to administrative and executive posts in industry and commerce, and help them to gain the fullest advantage from their individual qualities of character and their experience developed in war service.

The Ministry has appointed Mr. F. C. Hooper as director of business training to supervise the planning and carrying out of a training scheme, which is an important part of the plans, already far advanced, for helping men and women to secure posts suited to their capabilities.

Apprentice Training

Higgs Motors, Ltd., Witton, Birmingham, have sent us a copy of a booklet which they have produced as a guide to their apprenticeship scheme. There are two forms of apprenticeship; that which aims at giving a general training, qualifying those who take it for positions on the company's technical or commercial staff, and a trade apprenticeship which enables those who wish to follow a particular trade to serve their time in the appropriate department.

The term of apprenticeship is four years; no premiums are required and apprentices are paid on the agreed scale. An annual bonus, more than enough to cover technical school fees, books and tools, is paid to those whose conduct and work are satisfactory. The company has an arrangement with the Aston Technical College by which apprentices attend there for one afternoon and two evenings a week.

The booklet contains illustrations of the company's works and products.

Import Licensing Department

The address of the Import Licensing Department of the Board of Trade is now 189, Regent Street, London, W.1 (telephone: Regent 4090).

Gauge and Tool Exhibition

The Gauge and Tool Makers' Association is arranging an exhibition of its member-firms' products at the New Hall, Vincent Square, S.W.1, from January 7th to January 19th inclusive. There will be nearly a hundred stands and one of the principal objects of the exhibition will be to stimulate export trade.

Brush Foremen's Conference

The third annual conference of the Foremen's Association of the Brush Electrical Engineering Co., Ltd., was held at the company's works at Loughborough from September 21st to 23rd; the theme of the conference was "Education and Training in Industry." The 140 delegates included the foremen of the company and its subsidiaries and foremen from other industrial concerns throughout the country. Mr. F. S. Mitman, managing director of the company, presided at the dinner opening the conference on the first evening, at which Dr. Mont Follick, M.P. for Loughborough, was the principal guest.

During the various sessions the following addresses were delivered:—"Adult Education: Education for Social Responsibility," by Mr. E. Green, J.P. (Secretary, Workers' Educational Association); "The New Education Act: Some Practical Considerations," by Mr. D. B. Hoseason, assistant managing director, Brush Electrical Engineering Co., Ltd., and subsidiaries; "Training on the Job," by Mr. M. N. Exton-Wood, M.Sc. (National Institute of Industrial Psychology); and "Trade Union Aspects," by Mr. H. T. Edwards (Transport and General Workers' Union). The chairman of the Brush Foremen's Association is Mr. W. Smith and the secretary, Mr. R. A. Savage.

Mass Radiography for Reyrolle's

The first company within the Durham County Council's area to avail itself of the mass radiography service for taking miniature X-ray photographs of the chest is A. Reyrolle & Co.

Trade Publications

Siemens Electric Lamps & Supplies, Ltd., 38, Upper Thames Street, London, E.C.4.—Priced list (No. 980) illustrating "Sieray" fluorescent lamps, fittings and accessories, including circuit diagrams and details, superseding earlier list of same number.

John M. Henderson & Co., Ltd., King's Works, Aberdeen, Scotland.—Liberally illustrated brochure of 60 pages describing applications of mechanical handling and transporting equipment, including cranes of all types, coal and ash plant, electric aerial cableways and telphers, and electric furnaces.

Applicants for these publications should write on their firms' business notepaper.

Trade Announcements

Craig & Derricott, Ltd., manufacturers of control devices and the "Diacam" rotary switch, have moved into a new factory the address of which is Royal Works, Sutton Coldfield, near Birmingham (telephone: Sutton Coldfield 2547).

Mummery & Harris, Ltd., 46-50, Connaught Avenue, Frinton-on-Sea, state that they are extending their electrical department to include the sale of refrigerators, cookers, washing machines and other domestic equipment.

E. H. Jones (Machine Tools), Ltd., have opened new offices at 2, Albion Place, Leeds, 1.

Simmonds Bros. have moved to Bedcote Mill, Birmingham Street, Stourbridge, Worcs. (telephone: Stourbridge 57730).

The new address of the London Commercial Electrical Stores is 20-22, Cursitor Street, Chancery Lane, London, E.C.4 (telephone: Holborn 7180/1022).

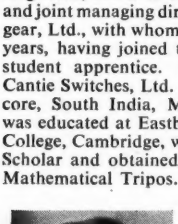
New Process Welders, Ltd., have closed their Southall factory and moved to new premises in Molesey Road, Hersham, Surrey (telephone: Walton-on-Thames 1007). All correspondence should be addressed to their London office, 76, Victoria Street, London, S.W.1, and communication direct with the factory should be made only in special circumstances.

The offices of the Lincolnshire & Central Electric Supply Co., Ltd., the Mid-Lincolnshire Electric Supply Co., Ltd., Altrincham Electric Supply, Ltd., Campbeltown & Mid-Argyll Electric Supply Co., Ltd., the Keswick Electric Light Co., Ltd., Thurso & District Electric Supply Co., Ltd., Windermere & District Electricity Supply Co., Ltd., and Public Utilities (Electric), Ltd., have been moved to 820-826, Salisbury House, Finsbury Circus, London, E.C.2 (Telephone: Clerkenwell 5738; telegrams: Linxelek. Ave, London).

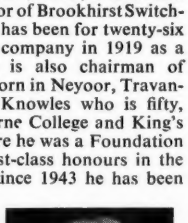
I.E.E. Chairmen—III

Biographies of Centre Officers

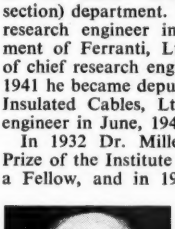
THE chairman of the Mersey and North Wales Centre of the Institution of Electrical Engineers, **Mr. J. O. Knowles, M.A.,** is chairman and joint managing director of Brookhirst Switchgear, Ltd., with whom he has been for twenty-six years, having joined the company in 1919 as a student apprentice. He is also chairman of Cantie Switches, Ltd. Born in Neyoor, Travancore, South India, Mr. Knowles who is fifty, was educated at Eastbourne College and King's College, Cambridge, where he was a Foundation Scholar and obtained first-class honours in the Mathematical Tripos. Since 1943 he has been



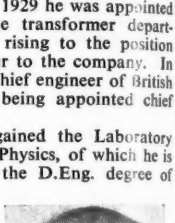
Mr. J. O. Knowles



Mr. R. I. Kinnear



Dr. J. L. Miller



Mr. G. D. Arden

a member of the B.E.A.M.A. Council and has served on B.E.A.M.A. and B.S.I. Technical Committees over a number of years.

Mr. Knowles's paper on "Layout and Rupturing Capacity of Low-tension Switchgear" was awarded the Page Prize in 1937. He is the author of several other papers and of a number of articles in the *Electrical Review* and other technical publications. He has been actively connected with matters relating to the education of apprentices in the Chester area.

The new chairman of the Scottish Centre, **Mr. R. I. Kinnear,** is chief electrical engineer to John Brown & Co., Ltd., engineers and shipbuilders, Clydebank, with whom he has served for forty-four years, having passed through all branches of the company's electrical department's activities. He was made a M.B.E. in 1942. Mr. Kinnear, who is sixty, was born at Aberfoyle and attended the Clydebank Higher Grade School and Glasgow Technical College.

Dr. J. L. Miller, the new chairman of the North-Western Centre, is chief engineer (equipment and telecommunications) of British Insulated Callender's Cables, Ltd., and a director of several associated companies. He was born in 1902 at Wallasey where he received his early education at the Grammar School before going to Liverpool University. After taking the Ph.D. degree in 1925 for postgraduate research he joined the Metropolitan-Vickers Electrical Co., Ltd., as a college apprentice, being eventually appointed to a post in the motor design (general engineering section) department. In 1929 he was appointed research engineer in the transformer department of Ferranti, Ltd., rising to the position of chief research engineer to the company. In 1941 he became deputy chief engineer of British Insulated Cables, Ltd., being appointed chief engineer in June, 1942.

In 1932 Dr. Miller gained the Laboratory Prize of the Institute of Physics, of which he is a Fellow, and in 1934 the D.Eng. degree of Liverpool University was conferred upon him for his various published contributions. In 1934 and 1938 respectively he was awarded the Paris Exhibition and Sebastian de Ferranti premiums of the I.E.E. He is on the Council of the Research Association of British Rubber Manufacturers, and is a member of numerous B.S.I. and E.R.A. technical committees. He is also a member of the American Institute of Electrical Engineers.

Mr. G. D. Arden, chief electrical and power engineer to the National Oil Refineries, Ltd. (Anglo-Iranian Oil Co., Ltd.), Skewen, Glam., who has been elected chairman of the West Wales Sub-Centre, was born in South London in 1884. After training at the Crystal Palace Engineering School he became a pupil in the Exeter Corporation Electricity Department in 1903, becoming shift engineer and mains assistant a year later. At Exeter he assisted in the erection of a new power station, the conversion of the 100-cycle system to 60 cycles, and the installation of the tramways. In 1906 he was appointed mains engineer at Southampton and was later mains superintendent. In 1912 he went to Derby as chief mains engineer. From 1915-20 he served in the Signal Service, Royal Engineers, with the B.E.F. in France and then became chief electrical engineer to Ironside & Co., exporting consultants. He joined the Anglo-Iranian Oil Co., Ltd., in 1926.

ELECTRICITY SUPPLY

Kenilworth House Installations. Rate Relief at St. Pancras.

Bermondsey. — COOKERY CLASSES FOR TENANTS.—Realising that many of the new hutment tenants and others have no experience of electric cooking, the Electricity Committee proposes to institute a series of electric cookery classes at the Jamaica Road showrooms on Thursday afternoons. Owing to the limited accommodation available, invitations will be issued weekly to about a dozen new tenants or prospective tenants, and later the invitations will be extended to any residents who may be interested. It is also proposed to ask the school authorities to send scholars interested in housewifery to the classes.

Chesterfield.—SUPPLY SCHEME.—Following the receipt of a petition from residents, the Electricity Committee has obtained authority from the Electricity Commissioners to proceed with a scheme for supplying Cutthorpe with electricity.

Glasgow.—MODERNISATION OF PUMPING STATION.—The Sewerage Committee has asked the Electricity Department to report on a proposal to change over from steam to electricity at the Kinning Park pumping station.

RENEWAL OF CABLES AT GASWORKS.—The gas manager has been authorised to arrange for the Electricity Department to install new cables and external lighting system at the Provan works at an estimated cost of £9,500.

INSTALLATIONS IN SCHOOLS.—The Education Committee has arranged for the Electricity Department to install electric lighting at the Albert and Balgray schools at a cost of £697 and to change over the system at Kinning Park cooking department at a cost of £850.

Hackney.—FUSE REPLACEMENTS.—At present a charge of 1s. 6d. is made for fuse replacements on consumers' premises. It is proposed that in future the work shall be carried out free of charge, as before the war.

Jarrow-on-Tyne.—OVERHEAD DISTRIBUTION.—The North-Eastern Electric Supply Co., Ltd., has submitted plans to the Corporation for supplying electricity to temporary houses by means of overhead lines. The Corporation has approved the plans, but has expressed its preference for underground cables.

Kenilworth.—ELECTRICAL EQUIPMENT OF HOUSES.—The Housing Committee proposes to install electric lighting and power, including electric cookers and washboilers in 200 houses to be erected on the Bulkington Estate.

Kent.—STREET LIGHTING CONTRACT.—A combined meeting of the Westbere and Sturry Parish Councils, at which Mr. W. B. Stockdale, of the S.E. Kent Electric Power Co. outlined a scheme for electric street lighting, unanimously resolved to accept the company's tender. It was stated that the Councils felt that the renovation of existing gas standards, and the erection of additional ones, would be too costly.

St. Pancras.—ALLOCATION OF PROFITS.—The Finance Committee has considered the allocation of profits of the electricity undertaking; for the years 1939 to 1944 these totalled £79,140. The Council has already set aside £20,000 as a working balance and agreed to allocate £30,000 for post-war developments, and in making good damage by enemy action £13,980 has been spent. There is thus a balance of £15,150 and the Committee recommends that £15,000 shall be appropriated for the relief of the rates.

Stockton-on-Tees.—NEW SUBSTATIONS.—In connection with the erection of 461 houses on the Darlington Lane estate the chief engineer and manager of the Electricity Department (Mr. N. Hunter) has submitted estimates for the erection of two new substations together with modifications at an existing substation. The total cost is estimated at £20,653 and it is proposed to make application for permission to borrow this amount.

Stoke Newington.—EXTENSIONS.—The Electricity Committee is to extend cables and provide new substations at a cost of £50,134.

West Lothian.—LIGHTING IN COUNCIL HOUSES.—At a meeting of the County Housing Committee it was complained that fifty houses in one district had been without light for a month owing to failure of the gas supply. The Committee agreed that electric light should be installed in all Council houses where gas was unsatisfactory.

Wood Green.—TARIFF FOR TEMPORARY HOUSES.—The Northmet Power Co. has informed the Housing Committee that the terms for supplying electricity to Portal type houses will be the " all-in " rate with a fixed charge of 10d. per week and ½d. per kWh plus 12½ per cent. for all electricity consumed. A request by the company that the Council should collect the weekly fixed charge with the rent, subject to an allowance of 5 per cent. to cover the cost of collection, has been agreed to.

Overseas

Canada.—COLUMBIA DEVELOPMENT SURVEYS.—It is reported that preliminary surveys have been begun with a view to developing additional power from the Columbia River. A final engineering plan is not expected for five years; it will be presented to the International Joint Commission which will make recommendations to the Canadian and United States Governments. According to *Electrical News and Engineering* (Toronto) the plan envisages the construction of dams all along the Columbia River. The potential capacity is given as 30,000,000 HP.

Spain.—POWER SUPPLIES CUT.—Further cuts in electricity supplies are being made in the eastern and central provinces, including Madrid. Towns will be supplied only between 7 a.m. and noon or between noon and 5 p.m. on alternate days, while villages will have to make do with two hours' supply daily. Cafés and public houses must reduce consumption to 40 per cent. or be liable to immediate withdrawal of supplies. Theatres and cinemas will be limited to one show a day.

Under a trade agreement signed on September 15th, £150,000 worth of electric power is to be imported to Spain from France during the next six months.—*Reuter.*

South African Commission

Plant Extension Programme

PLANS of the South African Electricity Supply Commission for power plant extensions, held up by the war, are being pressed forward as rapidly as the equipment can be obtained. The most important scheme is the construction of the Vaal station, the design of which envisages an installed capacity of 200,000 kW with provision for extension. In 1939 an order for three turbines and a house set was placed with the Swedish firm of A.S.E.A. but because of the war these could not be shipped. In 1940 two sets were ordered from the Metropolitan-Vickers Electrical Export Co., Ltd.; they were received in January last and were placed in service in April. At the end of the year there were five 33,000-kW and one 7,500-kW sets together with six 190,000 lb. per hr. boilers in course of installation or on order for the Vaal station.

Delay in the completion of extensions at Congella is necessitating the utmost economy in consumption in the Durban undertaking. Although badly needed, a 40,000-kW set ordered in 1939 was released by the Commission for use in Britain where it was installed at Earley. Unfortunately, replacement plant sent in 1943 was lost at sea through enemy action. A second 40,000-kW set for a further extension was ordered last year, together with two additional 200,000 lb. per hr. boilers. In connection with the extensions, the 33-kV outdoor type switchgear is to be equipped with a fixed spray washing installation devised by the Commission's engineers.

In the Natal Central undertaking the Colenso station is to be extended by the installation of an additional 25,000-kW set and two 180,000 lb. per hr. boilers, with provision for two further duplicate sets and four boilers. Three cooling towers are to be constructed and a new air-conditioned control room is to be built with a semi-circular system diagram.

Railway Electrification

Another project concerns the Cape Town Corporation's Table Bay station (operated under a pooling agreement with the Commission's Salt River station). Permission was obtained from the British authorities in 1944 for the manufacture of a 40,000-kW set and two 230,000 lb. per hr. boilers, which it is hoped will be ready in time for the 1947 winter load. In the Cape area an important scheme of main-line railway electrification is to be carried out by the South African Railways and Harbours Administration, the first part of which covers 160 miles from Cape Town to Touws River; consideration is also being given to the electrification of a further 179 miles of track as far as Beaufort West.

The report of the Commission (signed by Dr. H. J. Van der Bijl, chairman) which gives this information refers to the increased cost of the power station extensions now in progress, adding that by comparison with pre-war prices the rise in the cost of some items of plant is almost 100 per cent., which seems to the Commission to be excessive. This and other factors, it is stated, may necessitate increases in electricity charges which hitherto it has been possible to avoid.

At December 31st last 806,650 kW of plant was installed in the Commission's main stations and a further 277,500 kW was on order. The output for the year reached the record total of 4,543·8 million kWh, an increase of 123·1 million kWh (2·8 per cent.) on the previous year. Sales amounted to 4,415·8 million kWh an increase of 140·2 million kWh (3·3 per cent.). The average cost per kWh sold advanced slightly from 0·1787d. to 0·1818d. and the price received from 0·1743d. to 0·1755d. (including sundry revenue, from 0·1790d. to 0·1805d.).

Cheap Coal

Coal costs per ton of 2,000 lb. varied from a mere 2s. 4d. at Witbank (this includes haulage by the Commission's own locomotives and trucks from adjoining collieries) to 23s. 4d. at Salt River. The lowest consumption of coal per kWh sent out was 1·507 lb. at Colenso (average BThU per lb. of coal 12,280; thermal efficiency 18·43 per cent.) but at Klip with coal of a lower calorific value (9,120 BThU per lb.) the average consumption of 1·763 lb. per kWh sent out gave a thermal efficiency of 21·22 per cent.

The revenue for the year was £3,321,870 (against £3,189,782) to which is added £31,638 adjustment in respect of the Witbank undertaking, making £3,353,508. Total expenses were £3,345,681 (£3,185,146) and there was thus a balance of £7,827 (£4,636).

An addendum to the report contains figures for the whole of the Union extracted from the 1942-43 industrial census. This gives the total electricity generated as 7,699·8 million kWh with 6,638·4 million kWh sold. Consumers numbered 374,919, of whom 317,368 were domestic, sales to the latter during the year averaging 2,666 kWh. There was a total installed plant capacity of 1,857,582 kW in 314 stations.

Magnetic Crack Detector

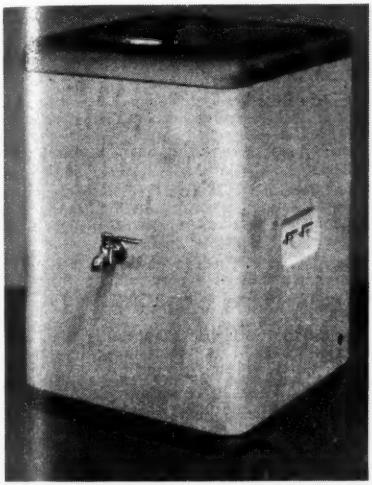
THE Equipment & Engineering Co. informs us that the DC impulse model crack detector described in our issue of August 10th last incorporates a "Westalite" rectifier manufactured by the Westinghouse Brake & Signal Co., Ltd.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Modern Wash-boiler

A SQUARE type wash-boiler of up-to-date design is the latest product of the NORTH WEST ENGINEERING CO., Copse Road, Fleetwood, Lancs. It is of attractive appearance, having



Square flat-top wash boiler

no sharp corners or edges, and a flat top makes it suitable for use as a table. The 3-kW elements have 3-heat control by means of two 15-A kick-down switches at the side. The more expensive model is vitreous enamelled with a chromium-plated top, the standard model having a galvanised finish for both case and top.

Engine Timer

A new engine timer recently designed by RUNBAKEN ELECTRICAL PRODUCTS, 71-73A, Oxford Road, Manchester operates on an entirely new principle. The h.t. current from the sparking plugs " triggers " a discharge from condensers which are fed by an internal convertor, and the result is an intense flash of exceptionally short duration. Its brilliance will illuminate fly-wheel marks even in daylight, and greatly simplifies timing and checking of engines. Models are now available for 6, 12 and 24 V.

Dust Collectors

Self-contained dust-collecting cabinets for attachment to individual machine-tools, which are announced under the trade name of " Drymat " by DALLOW, LAMBERT & CO., LTD., Spalding Street, Leicester, is a development of the " Drytex " model illustrated in the *Electrical Review* of April 21st, 1944. In place of the swan-neck suction pipe of the earlier design the dust-laden air enters the new cabinet in a less obtrusive manner. Pipes connect a polishing machine or grinder, for example, directly to a low-velocity settling chamber in which the larger particles of grit are deposited, while fluffy lint is collected by a special trap. The finer dust then passes upward to a filter composed of a series of mats, to the outside of which the fine dust adheres. This kind of filter is claimed to occupy half the space needed by the conventional bag type.

The cleaned air passes on to the exit at the top of the cabinet, through a curved-blade fan driven by a totally enclosed motor running at 2,800 RPM. The heavier dust and fluffy lint are collected in the lower drawer, while the lighter dust from the mat filter is deposited into the same receptacle by a simple hand-shaker lever at the side of the cabinet. The

Polishing machines fitted with dust collectors

unit construction of these collectors enables them to be re-disposed in a machine shop with facility, or transferred to different shops.

Hyderabad Project. — It is reported that the Nizam of Hyderabad has sanctioned the Godavary Valley development scheme which is estimated to cost Rs. 24 crores. It is expected to bring 800,000 acres of land under irrigation and to make available 75,000 kW for industrial development.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The Nigerian Electricity Supply Corporation, Ltd.—The accounts for the year ended February 28th last record a total revenue of £225,524 (against £198,192) and a net profit of £147,845 (£134,471). As already reported, a final dividend of 5 per cent. and a bonus of 2 per cent. (making 10 per cent. for the year) are again being paid, less tax at 5s. 2d. in the £. After providing £75,500 (£65,000) for taxation, £9,638 (£13,005) for debenture interest, £13,622 (£12,850) for debenture redemption and £7,500 (£26,500) for general reserve, £16,200 (£15,036) is carried forward.

It is stated that costs have steadily risen but no increase has been made in charges to consumers. The unprecedented lack of rain in April and May last resulted in practically a month's operation being lost.

Woking Electric Supply Co., Ltd.—Referring to the note in our issue of September 21st regarding the deferment of consideration of the payment of an interim dividend, the company says that when the question of payment of an interim ordinary dividend is dealt with it is the practice of the directors to have in front of them a half-yearly balance sheet. Owing to sickness and depleted staff in the accounts department it had been found impossible to prepare the figures in time for the meeting held on September 11th, and the matter was therefore held over.

The directors met again on September 25th and, with the accounts before them, resolved to pay, on October 8th, the usual interim dividend of 3 per cent. free of income tax on the ordinary shares in respect of the year ending December 31st next.

The Dubilier Condenser Co., Ltd., reports a profit for 1944-45, after the deduction of E.P.T., of £47,068, against £47,462 for 1943-44, and a net profit of £19,917 (£25,682). General reserve receives £10,000 and the ordinary dividend is raised from 10 to 20 per cent., leaving £22,895 (£25,675) to be carried forward. Last year £10,000 was transferred to war contingencies reserve.

H.T.A., Ltd.—This company (formerly Hall Telephone Accessories, Ltd.) announces that in view of changes in the manufacturing programme caused by the end of the war it has been decided to defer consideration of a dividend until the accounts for the year to December 31st next are available.

Herbert Morris, Ltd., are paying a final dividend of 15 per cent., free of tax, again making 20 per cent. for the year. The profits (after meeting taxation) totalled £129,586, against £145,683.

Rawlings Bros., Ltd.—The net profit for the year ended March 31st last was £7,261 (£8,078). The ordinary dividend is again 7½ per cent.

The Renold & Coventry Chain Co., Ltd., is paying a final ordinary dividend of 7 per cent. and a bonus of 2½ per cent., making 12½ per cent. for the year to July 1st last (against 10 per cent. for 1943-44). The trading profit for the year, after providing for depreciation, etc., is £202,930 (£207,098), to which is added £16,000 (nil) for E.P.T. recoverable. The net profit, after deduction of income tax, is £116,330 (£105,098).

The Sudan Light & Power Co., Ltd., reports a total revenue of £47,834 for 1944. The net profit was £31,834 (£31,543). General reserve receives £5,000 (nil) and a dividend of 5 per cent. (6 per cent.) is to be paid, leaving £43,125 (£39,970) to be carried forward.

The Brazilian Traction, Light & Power Co. has declared a dividend of $1 per share on the no-par-value ordinary shares. With the $1 dividend paid in June this again makes $2 for the year.

The Jerusalem Electric & Public Service Corporation, Ltd., recommends a first and final dividend of 5 per cent. on the ordinary shares, the same as last year.

The S.W. & S. Electric Power Co. announces interim dividends of 4 per cent. on the "A" ordinary and 2½ per cent. on the "B" ordinary shares.

The Midland Electric Corporation for Power Distribution, Ltd., is maintaining its interim ordinary dividend at 3 per cent.

The South Wales Electric Power Co. announces an interim dividend of 2 per cent., the same as last year.

The Wessex Electricity Co. is paying an interim dividend of 2 per cent. (same).

The Urban Electric Supply Co., Ltd., has declared an interim dividend of 4 per cent. (same).

The Salisbury Electric Light & Supply Co., Ltd., proposes to pay the usual interim dividend of 4 per cent.

The St. Austell & District Electric Light & Power Co., Ltd., announces an unchanged interim dividend of 4 per cent.

The Telephone & General Trust, Ltd., is maintaining its interim dividend at 3 per cent., less tax at 8s. 6d.

Newman Industries, Ltd., have again declared an interim dividend of 7½ per cent.

Cable & Wireless, Ltd., announce the payment of an interim dividend of 1½ per cent., as last year.

W. T. Henley's Telegraph Works Co., Ltd., has announced the usual interim dividend of 5 per cent.

New Companies

Hallcroft Electrical & Mechanical Apparatus Co., Ltd.—Private company. Registered September 19th. Capital, £1,000. Objects: To acquire the business of an electrical and general engineer carried on at Radford, Nottingham, by John Woolley, and to carry on the business of electrical, radio, refrigeration

and general engineers, etc. Subscribers: J. Woolley, 38, Norwood Road, Radford, Nottingham; and F. E. Galvin, 35, Park Street, Beeston. Secretary: W. A. Hickling. Registered office: Holly Lane, Chilwell, Notts.

Goddard Sound Equipment, Ltd.—Private company. Registered September 15th. Capital, £2,000. Objects: To carry on the business of electrical engineers, manufacturers of sound equipment, etc. Subscribers: Joan E. Penney, 48, Huddleston Road, N.7, and Marjorie I. L. Leaver, 40, Gaskarth Road, S.W.12. Secretary: H. Williams. Registered office: St. Albans Farms, Staines Road, Hounslow Heath, Feltham, Middlesex.

F. Renco, Ltd.—Private company. Registered September 13th. Capital, £500. Objects: To carry on the business of manufacturers of, and dealers in, electrical goods, bulbs, lamps and accessories, neon signs, ultra-violet ray apparatus, etc. Subscribers: Renee Sharon, 9, Dunmore House, Templecombe Road, E.9, and Eileen Hawtin, 1, Temple Road, N.W.2. Secretary: R. Sharon. Registered office: 203, Regent Street, W.1.

A. A. Electrical Co., Ltd.—Private company. Registered September 18th. Capital, £300. Objects: To carry on the business of manufacturers of, and dealers in, electrical and wireless goods, etc. M. C. George, C.A., 8, Cato Road, S.W.4, is the first director. Registered office: 19-20, Holborn Viaduct, E.C.1.

P. R. Mercen, Ltd.—Private company. Registered September 18th. Capital, £100. Objects: To carry on the business of manufacturers of electrical goods and accessories, bulbs, valves, neon signs, radio goods, etc. Subscribers: Eileen Hawtin, 1, Temple Road, N.W.2; and Jean Domnitz, 29, East Bank, N.16. Secretary: R. A. Sharon. Registered office: 203, Regent Street, W.1.

Twenty Four Hours Sign Co., Ltd.—Private company. Registered in Edinburgh September 10th. Capital, £3,000. Objects: To carry on the business of electrical and mechanical engineers, manufacturers of electrical condensers and electrical apparatus of all kinds, etc. Directors: W. Highgate, 121, Kyle Park Drive, Uddingston, Glasgow, and five others. Registered office: 66, Carntynehall Road, Glasgow.

Companies' Returns

Statements of Capital

British Thomson-Houston Co., Ltd.—Capital, £4,000,000 in £1 shares (2,000,000 preference and 2,000,000 ordinary). Return dated April 6th, 1945. 1,500,000 preference and 2,000,000 ordinary shares taken up. £3,425,310 paid. £74,690 considered as paid. Mortgages and charges: £1,075,260.

Interohm Electrical Insulators, Ltd.—Capital, £45,000 in £1 shares (36,000 preferred ordinary and 9,000 ordinary). Return dated May 4th. All shares taken up. £36,000 paid. £9,000 considered as paid. Mortgages and charges: Nil.

Ericssons Telephones, Ltd.—Capital, £700,000 in 199,970 preference shares at £1 each, 499,970 ordinary shares of 5s. each and 1,500,150 ordinary stock units of 5s. each. Return dated April 12th. 199,970 preference shares and 1,500,150 ordinary stock units taken up. £269,980 paid. £305,027 10s. considered as paid. Mortgages and charges: £50,000.

Vulco Dry Battery Co., Ltd.—Capital, £8,000 in 1,500 preference and 6,500 ordinary shares of £1. Return dated December 31st, 1944 (filed March 10th, 1945). All shares taken up. £3,667 paid. £4,333 considered as paid. Mortgages and charges: Nil.

Newcastle & District Electric Lighting Co., Ltd.—Capital, £600,000 in £1 ordinary shares. Return dated April 6th, 1945. 600,000 shares taken up. £600,000 paid. Mortgages and charges: £350,000.

Electric Ignition Laboratory, Ltd.—Capital, £2,000 in £1 shares. Return dated March 5th, 1945. 1,500 shares taken up. £1,500 considered as paid. Mortgages and charges: Nil.

Intercommunicating Telephone Manufacturing Co., Ltd.—Capital, £100 in 100 shares of £1 each. Return dated December 28th, 1944, filed February 1st, 1945. 100 shares taken up. £100 paid. Mortgages and charges: Nil.

Egyptian Power Syndicate, Ltd.—Capital, £10,000 in £1 shares. Return dated January 12th (filed April 3rd). 2 shares taken up. £2 paid. Mortgages and charges: Nil.

Walter Lambert, Ltd.—Capital, £1,000 in £1 shares. Return dated March 31st. 602 shares taken up. £602 paid. Mortgages and charges: Nil.

Rylands Electrical Co., Ltd.—Capital, £1,000 in £1 shares. Return dated April 17th. All shares taken up. £1,000 paid. Mortgages and charges: Nil.

Increases of Capital

Sterling Cable Co., Ltd.—The nominal capital has been increased by the addition of £49,900 in £1 ordinary shares beyond the registered capital of £100.

Mortgages and Charges

Correx Communications Equipment, Ltd.—Mortgage on moneys under contracts, dated September 11, 1945, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Receivers Released

Electroflow Battery & Engineering Co., Ltd.—E. W. Rufus ceased to act as receiver on August 27th.

British Lion Battery Co., Ltd.—H. Zamit ceased to act as receiver on August 31st.

Liquidations

Amazon Telegraph Co., Ltd.—Winding up voluntarily. Liquidator, Mr. A. C. Dickinson, A.C.A.

Bankruptcies

A. C. W. Wilson, electrical engineer, Wepre, Higher West Cross Lane, Swansea.—Order for discharge made August 8th subject to debtor's consenting to judgment being entered against him for £25.

STOCKS AND SHARES

TUESDAY EVENING.

THERE is a good deal of business doing in Stock Exchange markets. Continuance of the Thanksgiving Campaign throughout the country exercises a curb upon activity in gilt-edged securities, but the investor who favours industrial shares is steadily absorbing good class equities. In the latter group are included the ordinary shares of electrical equipment and manufacturing companies. Outside this range, such stocks as Cable & Wireless preference are attracting attention. The radio group is more animated than it has been of recent weeks.

Home Railway stocks continue their upward movement. Southern preferred, standing at 77 a few weeks ago, from which it fell 12 points in a fortnight, is now up to 70. The 5 per cent. preference, a full trustee security quoted at 121 last July, lost 16½ points before rallying to 107½. London Passenger Transport stocks are fairly steady.

British Electric Traction deferred remains dull at 1005. Thomas Tilling shares stand at 51s. Bristol Trams are 3s. 3d. lower at 50s.; shares have changed hands at 49s.

Home Electricity Supply

The fall which took place in the ordinary shares of electricity supply companies has been reduced fairly considerably by a subsequent rally, but prices are still well below those at which they stood before the General Election result became known. The rally is due in no small part to substantial orders to buy the shares from what are called "institutional" investors, amongst which may be reckoned insurance and trust companies, the banks, and similar bodies. Most of the floating supply of shares has now been absorbed, and although prices are well below the pre-election figures, the market has taken on a healthier tone.

Dividend Declarations

H.T.A. has disappointed its shareholders by deciding to defer consideration of a dividend until the accounts for the year to the end of December next are available. For years past the company has paid a 5 per cent. interim dividend in September. The final for each of the past four years has been 5 per cent., plus 2½ per cent. bonus, making 12½ per cent. for the year. On the announcement the price fell 2s. 9d. to 26s. 3d.

Other dividend declarations are, in nearly every case, the same as those of a year ago. Newman Industries, by the way, paid 22½ per cent. for last year, against 20 per cent. in the previous twelvemonth, and at the price of 7s. 6d. the yield is £6 8s. 4d. per cent.

Movements in Prices

Midland Electric Manufacturing shares at 7¾ are 5s. up and De la Rue at 11 are similarly better. The list shows a majority of rises. Westinghouse Brakes gained 3s. to 77s. 6d. and Reyrolle at 73s. 3d. are ⅛ higher. Telegraph Constructions have risen 1s. to 58s. 6d. and British Thermostat at a guinea show an equal improvement. Ever Ready are 9d. up at 42s. 3d. Other gains range from 6d. to 1s. In the electricity supply market, some of the provincial shares are a little easier; otherwise, there are no changes worth mentioning. Amongst overseas shares, Cawnpore Electric further advanced 2s. to 61s. 6d. Tokyo Electric hardened to 56½, Montreal Power rose to 25. The activity in Brazilian Traction continues. Declaration of the usual $1 half-yearly dividend failed to affect the price of 30¾.

Murex

Murex brings up its dividend for the year, to June 30th last, to the usual 20 per cent. This makes 180 per cent. distributed over the past nine years. The company's profits are £26,000 down on the year, due to a falling off in the demand for the company's products in the closing stages of the war and to the liquidation of stocks held by users and Government Departments. The report and chairman's statement will be published on October 20th, and the meeting held nine days later. The price of the shares has fallen 4s. 6d. to 97s. 6d., showing at that figure a yield of a trifle over 4⅛ per cent., allowing for inclusion of the final dividend and bonus payable on the 30th of next month.

Wireless and Cables

For the time being, A. C. Cossor are the most active shares in their particular group. The price has risen a florin to 44s. 6d. Philco are changing hands on the basis of 14s. 6d. E.M.I. shares hold their recent recovery at 33s. 9d., and E. K. Cole remain firm at 37s. 6d. Telephone Rentals, at the advanced price of 13s., are the subject of investment notice on post-war prospects.

Cable & Wireless preference improved to 115. The ordinary retains its advance to 91½. Globe Telegraphs are a good market, the ordinary at 42s. 6d. and the preference at 30s. 6d. Canadian Marconi's at 19s. 3d. continue to be bought by Montreal. Oriental Telephones at 65s.—about 8s. above their recent low level—reflect the hopefulness felt about the company's outlook now that Japan is defeated.

Television

The argument runs that as television is fairly certain to be one of the popular industries in early post-war days, shares in the companies that deal with it must be worth notice. On the other hand, it is contended that the business of television will be, colloquially speaking, cut to ribbons. A small feature in this department has been a rise from 2s. 6d. to 4s. 3d. in Cinema Television deferred shares. The company started, it may be remembered, as Baird Television, Ltd.; it is now one of the constituents of the Gaumont-British organisation.

Three-Phase Commutator Motors—II

Induction-regulator Type

By K. C. Howison, A.M.I.E.E.

VARIABLE-SPEED AC motors of the commutator type are of two kinds, one controlled by moving the brushgear and the other by an induction regulator. The former was described in the *Electrical Review* of September 28th. The basic principles of the induction-regulator type are generally similar, but it has no slip-rings. The primary winding, fed from the supply, is carried on the stator, and the secondary winding, on the rotor, is connected to a commutator.

In order that the motor may run above or below synchronous-speed the secondary winding must be supplied, as in the case of the Schrage motor, with a voltage equal to that induced in it by the primary. This is done by connecting in the rotor circuit an induction regulator, the primary of which is fed from the main supply. The induction regulator is a special form of transformer having a movable secondary winding. By rotating the regulator the secondary voltage is shifted in phase, thus enabling it to be vectorially added to or subtracted from the rotor volts. By employing a double induction regulator the phase shift is neutralised.

In addition there are two special-purpose windings. The first, a compensating winding, is carried in the stator slots; by transformer action it produces a voltage leading by 90 deg. the regulator and rotor voltages, thus improving the power factor. The second winding is of the DC type in the rotor slots and its purpose is to assist commutation, as interpoles do in a normal DC machine.

As in the case of the moving-brushgear commutator motor, speed variation is obtained by injecting into the secondary circuit a voltage equal in magnitude and frequency to the voltage induced in it at the desired speed. The induction regulator is a means of producing a voltage of variable magnitude which is fed to the secondary by way of a commutator and is converted at the brushes from mains frequency to slip frequency. The energy supplied to the stator is constant and independent of the speed. When running at sub-synchronous speed the slip energy is returned to the supply by way of the induction regulator. At synchronous speed the regulator carries no load whilst at hyper-synchronous speed the additional energy required is supplied by the regulator. This constant energy feature is utilised as a means of protecting the motor.

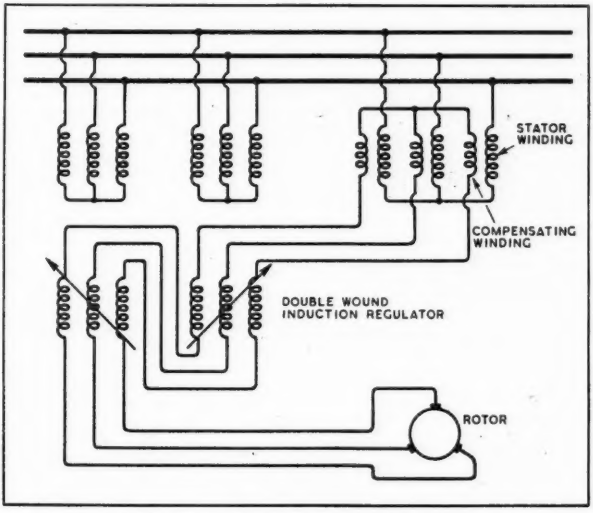


Fig. 1.—Induction regulator controlled motor

The torque of the induction-regulator-controlled motor is constant at all speeds and settings of the regulator. The speed, which depends upon the movement of the regulator,

can be continuously varied without steps and while under load. The motor can be constructed normally for a speed range up to ten to one and for still greater ranges if desired. The size of regulator will depend on the speed range since it handles the slip kVA. Once the speed is set, it remains constant for any setting of the regulator. A small variation in speed occurs, however, with fluctuations in load. In the author's experience, this variation is greater than it is with the moving-brushgear type, but opinions differ on this point.

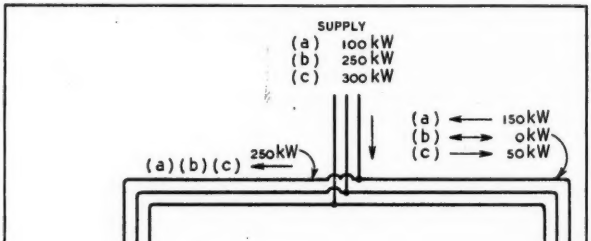


Fig. 2.—Energy flow in induction regulator controlled motor, (a) operating at sub-synchronous, (b) at synchronous and (c) at super-synchronous speed

While induction-regulator motors are normally made for one direction of rotation they can be reconnected to run in the opposite direction for reversible duty, in which event the brushes are set in the neutral axis and the compensating winding is put on a small separate transformer.

Since these motors are stator fed they may be wound for high voltages. Owing to the design of their commutator windings they can be made for rather larger outputs than can the moving-brushgear type. Motors up to 1,000 HP have been built and totally enclosed motors of large output are now available.

Their power factor is dependent on the speed and at any given speed is practically constant, tending to rise with decreasing load. At synchronous and hyper-synchronous speeds the power factor may approach unity, but at sub-synchronous speed it will be rather low especially if the speed range is wide. The efficiency is of a similar order to other AC motors with a favourable bias at the higher speeds.

The following notes on control and protection apply to either type of commutator motor except where otherwise stated. When the speed range is two to one or more, even large motors may be started with a normal direct-on starter. With hand control an interlock switch is usually fitted, so that the control handwheel must be returned to the minimum speed position before the motor is started. For the moving-brushgear type the handwheel is mounted on the motor endplate and moves the brushes, while on the induction regulator type it is carried on the regulator. In either case remote control up to about 20 ft. can be by means of a chain or wire rope. In the induction-regulator type the regulator can be placed away from the motor as most convenient to the operator.

Fully remote or push-button control can be arranged by fitting a fractional-horse-power pilot motor in place of the handwheel. In this way the main motor can be controlled from one or more push-button stations. By means

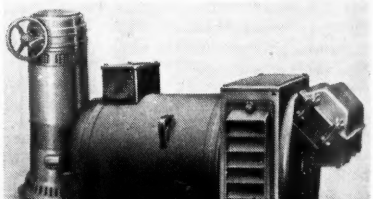


Fig. 3.—Motor with hand-operated induction regulator (*Laurence, Scott & Electromotors, Ltd.*)

of a pre-set controller it can be made to return always to the same speed conditions. By using a special two-speed pilot motor dynamic braking can be provided, since if the brush-gear is rotated to the maximum speed position at a greater rate than the main motor normally decelerates then a reverse braking torque is set up. A similar system of dynamic braking by DC injection can be employed in a stator-fed machine.

Overload protection is by means of normal thermal or magnetic overloads mounted on the control panel. When the motor is operating at constant torque the horse-power is proportional to the speed and the current will increase accordingly. For the stator-fed type the stator current at constant torque is roughly constant and the overloads can therefore be set to operate at over-torque conditions. In this it differs from the moving-brushgear motor which is without protection at low speeds unless special means are adopted for this purpose, for instance, a thermal relay within the motor.

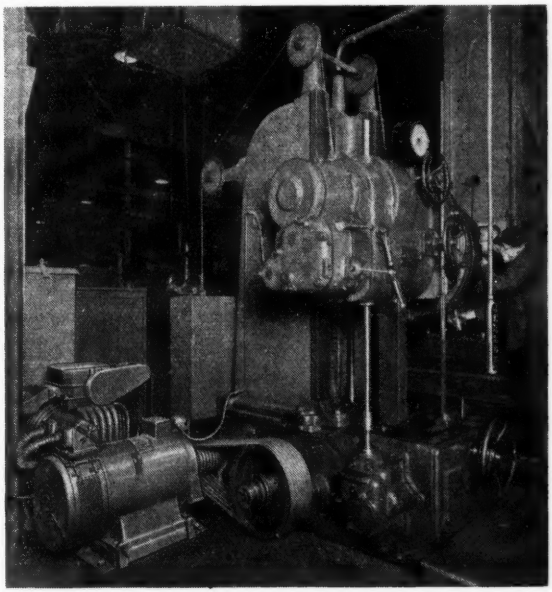


Fig. 4.—Motor with remote controlled pilot-motor-operated induction regulator driving Richards horizontal borer (Laurence, Scott & Electromotors, Ltd.)

Cost and Applications

The cost of commutator motors with control gear is considerably in excess of that of a standard type of motor. In order to obtain maximum efficiency and power-factor, unnecessarily wide speed ranges should be avoided and, when ordering, the full requirements should be stated, as considerable economies can be effected by suitable choice of range and frame size. Commutator motors have been successfully applied to printing machines, cable machinery, mill drives and machine tools. When a large machine is driven by several motors they may be electrically locked together so that they remain in step.

The author would suggest as a possible development the production of a range below 3 HP. He thanks the British Thomson-Houston Co., Ltd., and Laurence, Scott & Electromotors, Ltd., for permission to use photographs and data and Dr. Schwarz of the latter company for assistance and suggestions regarding induction-regulator motors.

Export Inquiries

WE have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territories. We shall be glad to pass on to them replies received from readers which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require the usual references:—

Norway.—Wholesale dealers wish to purchase all types of domestic materials (except cooking and heating apparatus), motors and generators, industrial control equipment, thermostats, measuring instruments, line materials and high-voltage materials. (X.118.)

Holland.—Importer wants supplies of fuses, plugs, lampholders, accessories, metal presses, etc. (X.119.)

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *may be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

AKT.-GES. für Technische Studien.—"Method for the working of thermal power plants." 9095/44. May 14th, 1943. (571938.)

Aktiebolaget Elektrolux.—"Absorption refrigerating apparatus." 19894/43. November 27th, 1942. (571958.)

Allmanna Svenska Elektriska Aktiebolaget.—"Means for regulating a machine voltage." 14172/43. September 28th, 1942. (571851.)

C. L. Arnold, R. W. Dowsett and M. K. Electric, Ltd.—"Electrical socket contacts." 20866. December 13th, 1943. (571900.)

Automatic Telephone & Electric Co., Ltd., C. Gillings and C. E. Beale.—"Telephone or like systems." 3129. February 19th, 1944. (571908.)

British Mechanical Productions, Ltd., and F. C. Fuke.—"Connector pins for electrical plug and socket connections." 20581. December 9th, 1943. (571869.)

British Thomson-Houston Co., Ltd.—"On-load tap-changing systems for transformers." 20913/43. December 14th, 1942. (571871.) "Transformer systems." 4046/43. March 20th, 1942. (571877.) "Methods of forming intricate shapes from extruded metal powder." 11406/43. July 14th, 1942. (571881.)

British Thomson-Houston Co., Ltd., and A. P. Castellain.—"Stereoscopic projection." 8764. June 1st, 1943. (571944.) "Stereoscopic cinematography." 8765. June 1st, 1943. (571945.) "Stereoscopic projection." 8766. June 1st, 1943. (571946.)

British Vacuum Cleaner & Engineering Co., Ltd., and I. G. O. Brown.—"Unidirectional drive mechanism." 13868. August 25th, 1943. (571849.)

British Vacuum Cleaner & Engineering Co., Ltd., and W. Clark.—"Synchronous electric motors." 13867. August 25th, 1943. (571848.)

Brush Development Co.—"Piezoelectric transducers." 526/44. January 11th, 1943. (571904.)

E. L. W. Byrne (Titeflex Metal Hose Co.).—"Conduit clamp." 15209. September 16th, 1943. (571854.)

Dorman & Smith, Ltd., T. Atherton and J. Lund.—"Sockets for electric plugs." 513. January 11th, 1944. (571839.)

E. Frank.—"Electrical socket contacts." 21016. December 15th, 1943. (571838.)

Hoover, Ltd., A. W. White and R. J. Gilson.—"Dynamo-electric machines." 21581. December 24th, 1943. (571965.)

R. Illingworth.—"Kitchen units." 20006. November 30th, 1943. (571899.)

Johnson & Phillips, Ltd., and C. J. H. Stevens.—"Electrical insulators." 19004. November 15th, 1943. (571930.)

O. K. Kolb.—"Unidirectional microphones." 20688. December 10th, 1943. (571870.)

Landis & Gyr. Soc. Anon.—"Maximum demand meters." 15692/42. November 20th, 1941. (571815.) "Resonance spring drive for the remote control of electrical apparatus." 19921/43. December 3rd, 1942. (571866.)

Marconi's Wireless Telegraph Co., Ltd.—"Variable permeability tuning arrangements for radio or like apparatus with band-spread tuning." 17503/43. October 24th, 1942. (571836.) "Variable inductances." Cognate applications 17504/43 and 17505/43. October 24th, 1942. (571858.)

Marconi's Wireless Telegraph Co., Ltd., E. R. Burroughes and H. H. Lightfoot.—"Light-current electrical switches particularly for use in radio apparatus." 19978. November 30th, 1943. (571898.)

Mawdsley's, Ltd., and C. W. H. Minchin.—"Dynamo-electric machines." 638. January 12th, 1944. (571968.)

H. W. M. Pook.—"Electrically heated hair waving apparatus." 18821. November 12th, 1943. (571894.)

Premier Electric Heaters, Ltd., and H. T. Taylor.—"Electric and other fires." 16924. October 15th, 1943. (571924.)

D. Rushworth.—"Reels for holding electric cable or for like purposes." 17398. October 22nd, 1943. (571857.)

T. Saxer.—"Apparatus for toasting bread and other foodstuffs." 447. January 10th, 1944. (571903.)

Scophony, Ltd., G. Wikkenhauser, P. L. F. Jones and D. P. Franklin.—"Electric induction motors." 19405. November 19th, 1943. (571896.)

Siemens & General Electric Railway Signal Co., Ltd., and H. J. N. Riddle.—"Generation of electrical pulses." 21406. December 21st, 1943. (571963.)

Smart & Brown (Engineers), Ltd., and H. Sonnenfeld.—"Electrical switches." 21479. December 22nd, 1943. (571964.)

Standard Telephones & Cables, Ltd.—"Visual indicators for electrical circuits." 764/44. February 13th, 1943. (571970.)

Standard Telephones & Cables, Ltd., F. Fairley and A. C. Delamare.—"Tools for removing insulation from electric conductors." 4120. March 6th, 1944. (571875.)

Stora Kopparbergs Bergslags Aktiebolag.—"Electrically heated gas producers." 4515/43. June 13th, 1942. (571878.)

Taylor Electrical Instruments, Ltd., and D. Rich.—"Electric multiple switches." 20267. December 3rd, 1943. (571960.)

Telegraph Construction & Maintenance Co., Ltd., and H. F. Wilson.—"Process for the preparation of polymerised hydrocarbons in powder form." 3524. March 17th, 1942. (571814.)

Westinghouse Electric International Co.—"Inductive heating apparatus." 17295/43. October 31st, 1942. (571887.)

H. Wood & Co., Ltd., and A. Hayes.—"Cable plug connection." 16887. October 14th, 1943. (571835.)

E. Wright.—"Thermally operated electric switch suitable for fire detection." 20057. December 1st, 1943. (571959.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—Victorian State Electricity Commission. October 10th. One or alternatively two 30,000-kW steam turbo-generators, complete with condensing plant, pipework and accessories, for Newport "C" power house. Specs. at Agent-General's office, London. Also two (alternatively four) water-tube boilers with auxiliaries (Spec. 45-46/4).

October 24th. 66-kV and 22-kV outdoor switchgear and accessories (Spec. 45-46/13).

Rockhampton City Council. October 20th. One 5,000-kW turbo-alternator.

Melbourne and Metropolitan Tramways Board. November 5th. Pumpless rectifier equipment. Tender 1351, Controller of Stores.

Eire.—January 28th. Electricity Supply Board. Hydro-electric generating plant at Cathaleen's Fall and Cliff stations on the River Erne. (September 28th.)

Hackney.—October 26th. Electricity Department. Six 500-kVA transformers. (See this issue.)

Manchester.—October 26th. Electricity Committee. Ventilating plant for No. 2 boiler house, etc., Stuart Street generating station. (See this issue.)

Redcar.—October 6th. Town Council. Cable laying, etc. (September 21st.)

Scotland.—November 6th. North of Scotland Hydro-Electric Board. 11-kV distribution lines, Morar area, Inverness-shire. (See this issue.)

Sheffield.—November 5th. Electricity Committee. 20-MVA, 33/11-kV transformer. (See this issue.)

Woolwich.—October 9th. Electricity Department. One 750-kW Diesel alternator and four 30-MVA outdoor reactors. (August 31st.)

Orders Placed

Bedford.—Electricity Committee. Accepted. 11-kV switchboard with ancillary apparatus (£11,850).—A. Reyrolle & Co. Batteries (£795).—Chloride Electrical Storage Co.

Fulham.—Electricity Committee. Accepted. Two 500-kVA transformers (£2,277).—British Electric Transformer Co., Ltd. 6-kV isolator equipment (£253).—Ferguson, Pailin, Ltd. Three-phase, four-wire board (£942).—W. Lucy & Co.

Glasgow.—Electricity Committee. Accepted. Transformers: Six 200-kVA and four 400-kVA (£1,576)—British Electric Transformer Co.; eight 400-kVA (£3,152) and six 800-kVA (£4,260).—Bruce Peebles & Co.

Corporation Sub-Committee on Lighting. Accepted. 500 lanterns for electric lamps (£2,475).—Revo Electric Co.

Hackney.—Electricity Committee. Accepted. Air heater (£3,863).—International Combustion.

Hammersmith.—Electricity Committee. Recommended. Transformers (£2,514).—Bonar Long & Co.

St. Pancras.—Contracts and Libraries Committee. Accepted. L.v. switchgear, Tavistock Place substation (£845).—English Electric Co. E.h.v. switchgear, Arlington Road substation (£8,155).—G.E.C. Single-phase meters.—Chamberlain & Hookham (250 25-A at £1 15s. 3d. each and 125 50-A at £2 2s. 6d. each); Ferranti (400 25-A at £1 15s. 3d. each and 100 50-A at £2 2s. 6d. each).

Newcastle-on-Tyne.—City Council. Accepted. Two 300-kVA transformers (£526).—Yorkshire Electric Transformer Co.

Stockton.—Corporation. Accepted. Laying of cables from Thompson Street to the Albany Road Estate.—Edison Swan Cables.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Cheshire.—Primary school at Lower Bredbury; E. M. Parkes, county architect, The Castle, Chester.

Clay Cross.—Permanent houses (30), Stretton Road estate, for U.D.C.; W. A. Evans, builder, Calow, Chesterfield.

Coventry.—Junior and infants' school, Radford school site; D. E. E. Gibson, city architect, 1a, Warwick Row.

Cowdenbeath.—Houses (100), with electrical work; J. Muir, joint town clerk, Town House.

Cumberland.—Staff quarters, Penrith Institution; Jas. Leslie & Sons, builders, Coach Road, Whitehaven.

Dearham (Cumberland).—Houses (40) for the North Eastern Housing Association; P. L. Browne, Son & Harding, architects, Pearl Buildings, Newcastle-on-Tyne.

Dudley.—Police houses (30), various sites; borough engineer.

Easington.—Houses (522) on eight sites for the R.D.C.; surveyor, Council Offices.

Exeter.—Houses (176), Wonford estate; city architect.

Farnborough (Hants).—Houses (100), Hawley Lane; I. C. Jenkins, surveyor, Town Hall.

Fulham.—Reconstruction, Wyfold Road flats (£12,670); borough engineer.

Gateshead-on-Tyne. — Factory for Harris Gowns, Ltd., on the Team Valley Trading Estate; J. H. Natter, 36, Eldon Place, Newcastle-on-Tyne.

Factory for Sigmund Pumps, Ltd., Team Valley; York, Rosenberg & Mardall, 35, Welbeck Street, London.

Glasgow.—Extensions to Mitchell Library (£36,000); city engineer.

Grimsby. — School, Yarborough Road; borough engineer.

Hanley.—Additions to premises, Couldon Place (£50,000), for craft training school; governors of North Staffs Technical College, Victoria Road, Stoke-on-Trent.

Ipswich.—Houses (174), Whitton; E. MacLaughlan, borough surveyor, Town Hall.

Islington.—Flats (132), Canonbury estate; Harry Monson, architect.

Leeds.—Completion of new central block at University; University Senate.

Lewisham.—Flats, 1, Dartmouth Terrace; Wellington Developments, Ltd.

Lowestoft. — Factory, St. Johns Road; Jeckells & Sons, Ltd.

Midlothian.—Houses (20), with electrical work, Ratho Village and Kirknewton; county clerk, County Rooms, George IV Bridge, Edinburgh, 1.

Millom.—Houses (20), for R.D.C.; J. Hankey, surveyor, Council Offices, Market Square.

Mitford and Launditch.—Houses (36), several parishes, for R.D.C.; W. J. Barton, clerk, The Guildhall, East Dereham.

Morecambe.—Houses (38), Hestham Hill; borough engineer.

Newbury.—Houses (31), Doveton Way; borough engineer.

Newcastle-on-Tyne.—Additions to Woolsington Airport; city engineer, Town Hall.

Houses (87) Newton Park estate; Wilkinson Brothers, builders, Pillars Yard, High Street, Gateshead.

Rochdale.—Houses, The Greave (50), and Turf Hill (20) for Corporation; G. & J. Seddon, Ltd., builders, 3, Manchester Road West, Little Hulton, near Bolton.

Saffron Walden.—Houses (66), Ashdon Road; H. C. Stacey, town clerk, Municipal Offices.

South Shields.—Houses (22), to cost £1,200 each; J. W. Ridley, St. Mary's Avenue.

Stoke-on-Trent.—Extensions and new nurses' home, Orthopædic Hospital, Hartshill; secretary, North Staffs Cripples' Aid Society.

Sunderland. — Seven community centres; borough engineer.

Swansea. — Development, trading estate, Fforestfach; Slough Estates, Ltd.

Factory, Pontardulais Road; Smiths Potato Crisps, Ltd.

Wellingborough.—Houses (40), Neilson estate; R. Kilby, surveyor, Council Offices, Swanspool.

Wick.—Houses (42), with electrical work; J. R. Ballantyne, surveyor, 112, Bath Street, Glasgow.

Wigan.—Church, Sunday Schools and caretaker's flat (£8,000); secretary, Gidlow Methodist Church, Gidlow, Wigan.

Willenhall.—Houses (34), Portobello and Monmore Lane sites, for U.D.C.; surveyor, Council Offices.

Worksop. — Rehabilitation centre, Firbeck Hall (£30,000); Miners' Welfare Commission, Ashley Court, Ashtead, Surrey.

Worthing.—Houses (25), Meadow Road site; borough engineer, Town Hall.

Wymondham. — Houses (£17,262), Silfield estate, for U.D.C.; R. G. Carter, Ltd., builders, Drayton, Norwich.

Municipal Reports

West Ham

THE total war damage claim of the West Ham Electricity Department now amounts to £500,000, of which £135,000 has already been paid as part of the cost of essential repairs carried out. The engineer and manager, Mr. J. W. J. Townley, in his report for 1944-45, says that during the year further damage was suffered due to flying and rocket bomb attacks, the most serious incidents occurring in July when there were two direct hits on the head office and depot in almost precisely the same spot. Some 118 ft. in length of the main building, the main stores with a large part of the stock and outbuildings, were completely destroyed. The destruction included the transformer station, meter test department and general workshops, with nearly all their valuable equipment.

Since the commencement of enemy air attacks nearly 12,000 services have been disconnected from badly damaged or destroyed premises, 2,000 during the past year. Nevertheless total sales of electricity increased during the year from 135·2 million to 136·5 million kWh, although this was still 20·5 million kWh less than in 1939-40. Gross revenue (including sales department) was £785,908 (£754,431) with working expenses of £618,839 (£568,551) and there was a net profit of £5,202 (£15,977). The average price obtained per kWh sold increased from 1·18d. to 1·22d.

A draft scheme for the construction of what is substantially a new generating station was submitted to the C.E.B. early in the year and a further direction was issued for the installation of a 30,000-kW set and boiler plant; with the set covered by a direction issued in 1943 this will form one third of the ultimate capacity of 180,000 kW. Last year 111·6 million kWh was generated by the Department compared with 98·0 million kWh in 1943-44.

Maidenhead

The borough electrical engineer of Maidenhead, Mr. C. A. Britton (who is leaving to take up a post with the Sudan Light & Power Co., Ltd.), reviews the future outlook of the undertaking in his report for 1944-45. He points out that there is a wide field for development; there are still 2,143 premises without electric service and the use of electricity for space heating, water heating and cooking is well below that in some other parts of the country. The establishment of offices and modern showrooms in the business centre of the town should be considered as soon as is opportune.

Total income last year was £103,532 (£87,984) and working expenses amounted to £85,553 (£75,404), there being a net profit of £8,625 (£2,331). A total of 15·8 (13·0) million kWh was sold at an average price of 1·460d. (1·530d.), with costs amounting to 1·369d. (1·530d.) per kWh sold.